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U. S. DEPARTMENT OF AGRICULTURE

Projects on
FIELD CROPS
Part 8, Section a
Cereal Crops

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

Compiled March 1958 by

The State Experiment Stations Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

Issued July 1958

FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL EXPERIMENT STATIONS

Projects on

FIELD CROPS

Section a: Cereal Crops

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INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.

I. GENERAL

A. Varieties, Breeding and Genetics

Alaska

Breeding New Cereal Varieties for Alaska. Develop improved cereal varieties (wheat, oats, barley) for release to growers in Alaska.
Agron. 38

Alaska

Use of Mutagenic Agents in Cereal Crop Improvement. To (1) aid the development of superior cereal varieties for Alaska through the production of desirable mutations by mutagenic agents, & (2) compare effectiveness of different mutagenic treatments as measured by genetic changes in cereal crops under Alaskan conditions.
Agron. 43 Coop. AEC

Ariz.

The Improvement and Culture of Small Grains. To (1) develop new varieties of small grains better adapted to Arizona environmental conditions; (2) test new varieties of small grains for grain production; & (3) develop improved cultural practices for the production of barley, wheat, & oats.
Agron., Range Mgt. 305 Coop. ARS

Ark.

Improvement and Testing of Winter Small Grains. (1) Develop varieties of winter small grains with high yielding ability that are as good or better than recommended varieties & are superior in 1 or more of following: lodging resistance, non-shattering, good quality of grain, winter hardy, acceptable uniformity of grain & plants. (2) Learn mode of inheritance of agronomic characters & association of component characters with yield; test new promising strains of small grains & new varieties & strains proposed for release to compare performance with present proven varieties.
Agron. 124

Calif.

The Application of Quantitative Genetics to Plant Breeding Theory and Practice. To (1) study appropriate metrical characters in plants in order to evaluate genetic & environmental forces governing these characters; & (2) apply results to breeding of improved varieties of crop plants.
Agron. 1562

Calif.

Mechanisms Producing New Races and Species of Plants. Learn (1) role of quantitative & structural changes of chromosomes in producing morphological & physiological effects adapting populations to various conditions of soil & climate; (2) role of new genetic combinations in extending range of tolerance of a species & origin of new species at the diploid level.
Bot. 1734

Conn.

The Effects of Inbreeding and Crossing upon Seed and Vegetatively Propagated Plants. Successive generations self-fertilized and compared with original types and strains separated after uniformity is attained, and further self-fertilized and tested for complete fixity of type and similarity of genetic constitution, to determine whether all inbred plants are reduced to the same degree when the reduction in growth ceases and whether, when reduction in growth ceases, constancy and uniformity are retained.
Genet. 502

Conn.

Variation in Cytoplasmic Components of the Cell with Special Attention to Pollen Abortion in Maize, Tobacco, and Petunia. Further information is needed concerning the possible differences between sterile plants of different sources, the stability of the pollen abortion under different environments & in different genotypes.
Genet. 505

Fla.

Small Grain Improvement by Breeding and Selection. (1) Develop high yielding adapted varieties of small grains possessing desirable agronomic characteristics for grain & forage production with resistance to major disease & insect pests; (2) Conduct studies on diseases & inheritance of disease resistance & agronomic characters to develop a more effective breeding program.
Agron., Pl. Path. 783

Ga.

The Improvement of Cereal Crops Through Breeding. To (1) develop varieties of small grains that are resistant to diseases and give high yields; (2) develop winter-hardy varieties of oats for north Georgia that are resistant to diseases and give high yields; (3) develop high-yielding, disease-resistant hybrid corn adapted to Georgia.
Crops, Agron. 27

Ga. Small Grain Breeding. To develop & evaluate (1) superior, disease-resistant varieties of oats suitable for grain & forage; & (2) high-yielding, disease-resistant varieties of rye for winter grazing.
Agron. 202

Ind. Genetics and Cytogenetics of Present and Potential Crop Plants. (1) Establish mode of inheritance & interaction of characters in crop plants for which genetic explanation has not been established. (2) Introduce species not studied & establish range of heredity variation in relation to their adaptation. (3) Induce new mutations by ultra-violet light, X-ray, radioactive isotopes, colchicine, mustard gas, hydroxyquinoline, & by biologic mutagens as Ds-Ac system in corn. (4) Evaluate agents for mutagenic activity thru analysis of mutations produced.
Agron. 831

Iowa Cytogenetic Investigations on Cereals. To (1) obtain understanding of relationships between chromosomes of wheat & rye; (2) uncover new & usable genes in common wheat, which now has few genes useful in common genetic procedures; (3) develop new methods of producing amphidiploids in hybrids involving wheat & its relative; (4) apply techniques already developed for wheat to other cereals; & (5) investigate cytology of Mindo & Clinton oats.
Genet. 1181

Kans. Crop Production. Variety tests of wheat, oats, barley, flax, & sorghum at Manhattan.
Agron. 129

Kans. Oats and Winter Barley Breeding and Testing. Develop improved varieties of oats & winter barley for Kansas, conduct nursery tests of these varieties thru State, & conduct research studies to improve methods & obtain genetic information.
Agron., Bot., Pl. Path., Ent. 464 Coop. ARS

Ky. Breeding Improved Varieties of Wheat, Oats, and Barley for Kentucky. To (1) develop thru introduction, selection, & hybridization, improved higher yielding varieties which incorporate such desirable characteristics as winter hardiness, disease & insect resistance, satisfactory quality, & good agronomic type; (2) develop methods for selecting breeding material for above characteristics; (3) compare adaptability of promising new strains with commercial type; (4) incorporate inheritance studies of specific characters which may be of use in future breeding.
Agron. 151 Coop. ARS

Md. Improvement of Small Grains for Feed. To (1) discover or originate better varieties of winter barley, winter oats, & spring oats for use in Maryland; (2) evaluate more accurately value of these feed grains in several crop regions; & (3) study varieties as to disease resistance, stiffness of straw, yield, maturity period, & other agronomic characters.
Agron. B-67 Coop. ARS

Mich. The Induction of Hereditable Changes in Higher Plants by Means of Isolated Genetic Material. Develop: (1) quick tests for screening of plant populations for genetic changes induced by isolated DNA; (2) methods for isolation of genetic material (desoxyribonucleic acid, DNA) in an unaltered & effective form from higher plants; (3) methods for introducing isolated DNA into proximity with the genetic apparatus.
Bot., Pl. Path. 867

Minn. Cytogenetics of Crop Plants. (1) To determine the number & location of the genes for disease reaction & other characteristics in wheat by the use of monosomics & nullisomics, & to study their use as one method of transferring desirable characters from one variety to another; (2) to use chromosomal stability as one criterion of selection in obtaining true breeding varieties in wheat & oats.
Agron., Pl. Genet. 1320

Miss. Rye and Wheat Breeding. To (1) test a collection of varieties of wheat and rye for forage type, disease reaction, and winter hardiness and resistance to lodging and determine their value for immediate commercial use, and as breeding material; (2) produce new varieties of winter wheat and winter rye resistant to currently important diseases, of suitable forage type and of good grain quality and yielding ability.
Agron., Crops HC-3

Mo. Mutation Studies in Arabidopsis Thaliana. Analyze (1) cause of inviability of induced mutants; (2) genes affective metabolic steps using mutants that are unable to carry out the synthesis of essential substances. (3) Learn range & nature of progressive mutation. (4) Study relation of nutritional differences to genetic effects of radiation.
Field Crops 331

Nebr. Improvement of Spring Small Grains.--Oats, Barley, and Spring Wheat: and Winter Barley. To improve spring-sown small grain and winter barley by (1) discovering in breeding material of these crops under Nebraska conditions; (2) finding and using strains with superior germ plasm in breeding better adapted varieties having resistance to major hazards of production; (3) investigating quality of varieties for yield & value of products; (4) determining underlying principles concerned in biology of cereal plants; & (5) making small quantities of foundation seed of superior varieties available for further increase.
Agron. 19 Coop. ARS

Nev. Evaluation of Agronomic Plants in Different Locations in Nevada. To learn effect of environment on productivity & quality of species & varieties of forage crops, small grains, & oil & fiber crops.
Agron., Range Mgt., Agr. Chem., Anim. Husb. 32 Coop. ARS

N. J. Breeding and Culture of Winter and Spring Small Grains. Selection and trials for adapted productive disease- and insect-resistant varieties of all small grain crops. Work with seed certification agencies to make good seed of the varieties available. Continue fertilizer, spacing, and time of planting studies. Investigate using field dessicants to improve quality.
Farm Crops. 259

N.Y. (Cornell) Cytogenetic Studies of Horticultural and Crop Plants. To apply fundamental principles of cytology and genetics to development of new and improved varieties of horticultural and crop plants such as corn, iris, rye, canteloupes and Cattleya orchids and to eliminate defects of certain varieties such as partial sterility which are cytological in nature.
Bot. 77

N.Y. (Cornell) Breeding and Testing Crop Plants.--A. Breeding Wheat, Oats, and Barley for Yield, Quality, Winter Hardiness, Disease Resistance and Stiff Straw. (1) make final evaluation of 9 bunt resistant lines of winter wheat from Cornell hybrid No. 4848; hybridize several sources of semi-dwarf & short wheats with adapted wheats; (2) Breed a "deciduous" awn type of winter barley. (3) Breed spring oats for crown & stem rust resistance. (4) Breed & test winter oats for increased hardiness with secondary goals of high yield, disease & insect resistance, & better plant types.
Pl. Brdg. 116-A Coop. ARS

N.Y. (Cornell)

Studies of Heredity in Plants.--B, Genetic Studies with Wheat, Oats, Barley, Rye, and Buckwheat. Special emphasis to study of inheritance of disease resistance, stiff straw, stooling ability, etc. of cereals, particularly mildew of barley and smut of oats. Studies on inheritance of straw stiffness in barley are being continued, and a similar study with oats and wheat is contemplated. Quality of wheat, vitamin B_1 content, will be studied genetically.

Pl. Brdg. 117-B

N.Y. (Cornell)

Studies of Heredity in Plants.--D, Analysis of Heredity in Plants in Terms of the Biochemistry and Physiology of Gene Action. (1) study of growth requirements altered by artificially induced mutations of genes; (2) artificial induction of gene mutations by chemical agents; and (3) investigation of adaptative response of organisms to new chemical environments.

Pl. Brdg. 117-D

N.Y. (Cornell)

Studies on the Nature, Differences, and Evolution of Genetical Systems in Plant Populations. To study experimentally the composition of different types of genetical systems in plant populations and to investigate ways by which they can be changed.

Pl. Brdg. 121 Coop. USPHS

N.Y. (Cornell)

Breeding for Cold Resistance in Small Grains. (1) Learn, separate, & study factors affecting cold resistance in small grains. (2) Develop lab. & field procedures for identifying cold resistant plants. (3) Screen small grains for sources of cold resistance & conduct breeding programs to develop winter hardy varieties.

Pl. Path., Ent., Bot., Agron. 124 (NE-23) Coop. ARS

N. Dak.

Cereal Crop Variety Testing. To test & evaluate cereal crop varieties for this area, spring wheat, winter wheat, winter rye, oats, barley, flax, & miscellaneous crops.

Agron., Cereal Technol., Agr. Chem. 6-2

N. Dak.

Coordination and Supervision of Agronomic Research Projects in North Dakota. To coordinate & supervise field plat experiments in various places of North Dakota. (1) Evaluating new cereal & forage crop varieties. (2) Testing new crops for this area, sunflowers, safflower, earlier ripening grain sorghums. (3) Increasing & distributing seed of new varieties. (4) Tillage trials to better conserve soil & soil moisture.

Agron. 6-5

Okla. Exploratory Studies in Radiations and Radiochemistry in Small Grains. To (1) determine validity of use of ultraviolet light in varietal testing of small grains; (2) use radiant energy sources to aid in production of insect, disease, and low temperature resistant varieties; and (3) explore uses of radioisotopes as energy sources and as tracers in small grains research.
Ent., Bot., Pl. Path., Agron. 861 Coop. ARS

Pa. Improvement of Wheat, Oats, and Barley. To develop superior varities of wheat, oats, & barley for Pennsylvania.
Agron. 1040 Coop. ARS

Pa. Genetic, Cytological, and Physiological Factors Involved in Hybrid Sterility. To assay some of the possible factors that may be involved in the breakdown of the normal chromosome mechanisms in sterile hybrids.
Pl. Path., Bot. 1215-A

Pa. Winterhardiness Investigations in Small Grains. (1) Evaluate sources of winterhardiness in oats & barley. (2) Develop techniques satisfactory for screening hardy germplasm. (3) Initiate breeding program for development of more-hardy high-yielding, stiff-strawed oats & barley varieties possessing desirable quality characteristics & disease & insect resistance. (4) Investigate management practices which will increase winter survival.
Agron. 1258 (NE-23) Coop. ARS

S. C. Breeding Small Grains. To (1) develop varieties of barley and wheat which are resistant to loose smut, mildew, rusts, and other diseases; (2) develop high yielding varieties of barley and wheat of desirable agronomic types; (3) evaluate strains and varieties of all small grains as to high yields of good quality forage; and (4) develop ways of increasing initial or breeders seed of superior varieties and of maintaining genetic purity.
Agron. 60

S. Dak. Breeding and Testing of Oats, Flax and Rye for South Dakota Conditions. (1) Develop & release strains that will improve or maintain yield level & incorporate resistance to yield reducing factors as disease, insects or environmental hazards. (2) Develop & release new strains which will fulfill needs of producer & consumer. (3) Study & evaluate plant breeding procedures as they apply toward improvement of grains.
Agron. 25-R

Tenn.

Evaluation of the Performance of Varieties of Field Crops. Crops to be appraised are cotton, corn, barley, oats, wheat, alfalfa, red clover, soybeans & grain sorghum.
Agron. 33 Coop. ARS

Wash.

Adaptation Studies of Cereal Varieties in Washington. To (1) determine relative performance of cereal varieties in various climatic & soil areas of Washington at different fertility levels; & (2) effect coordinated plan for testing cereal varieties on a state-wide basis.
Agron. 175 Coop. ARS

Wash.

Fundamental Genetic, Cytogenetic, and Radiobiological Studies in Cereals. Study biological effects of X-rays & other radiations. Utilize ionizing radiation in production of new genetic & cytogenetic phenomena in wheat & barley. Study effect of temperature, atmosphere, moisture, etc. applied before, during, & after radiation in modifying biological effects of X-rays, neutrons, & gamma rays, & the experimental control of induced mutation process. Study spontaneous mutations & chromosomal aberrations.
Agron. 1002 Coop. AEC

B. Culture and Physiology

Alaska

Cereal Crop Production. To determine effect of cultural practices & their interrelationships on yield and nutritional and industrial value of recommended cereal crop varieties in Alaska.
Agron. 39

Ariz.

The Nutritional Requirements for Increased Fat Production by Selected Crop Plants. To study effect of the quantity & time of application of the essential plant nutrients upon vegetative growth & the yield of fat with the principal aim to increase the content of fat in the vegetative shoot.
Bot. 250

Ariz.

The Control of Weeds on Irrigated Lands. To determine the most effective & economic methods of weed control on the irrigated lands of Arizona.
Agron., Range Mgt. 261 Coop. ARS

Ariz. Fertility Requirements of Crops on Alkaline-Calcareous Soils of Different Types, Under Semi-Arid and Irrigated Conditions. (1) Learn nature & extent of crop response to added nutrients on soils of different characteristics. (2) Evaluate nutrient interactions & levels of responsiveness. (3) Learn efficiency of different fertilizers with varying characteristics. (4) Evaluate effect of time & method of application. (5) Study effect of fertilizer on growth characteristics of plants & quality of product. (6) Relate crop response to nutrients, especially P, to existing & new methods of soil testing. (7) Relate crop composition & tissue test to nutrient response & soil test volume.

Agr. Chem. 266

Ark. Rotations and Fertilizer Experiments. To (1) continue a long-time rotation & fertilizer experiment begun in 1921; & (2) study effects on the soil of long-time rotations & fertilizer treatments.

Agron. 125

Ark. Supplemental Irrigation Investigations with Agronomic Crops. To (1) evaluate methods of learning critical soil moisture levels for irrigation; (2) learn optimum rate & grade of fertilizer & optimum time & method of application for agronomic crops grown under irrigation on major soil types of state; (3) evaluate yield responses when irrigation is by sprinkler & furrow methods; (4) learn effect of plant population, planting dates, & other cultural management practices that may have possibilities of influencing degree of response of agronomic crops to supplemental irrigation; (5) evaluate effect of land leveling operations; & (6) study methods of increasing infiltration rate of irrigation water into soil in which rate is slow.

Agron. 311

Ark. Studies of Physiological Factors Affecting the Growth of Agronomic Crops Grown Under Irrigation. To (1) determine critical time intervals of moisture stress which may affect yield & quality of certain selected agronomic crops; (2) learn water needs under varied levels of soil fertility, moisture conditions & stages of plant growth; (3) learn effect of supplemental irrigation on date & length of fruiting periods, maturity date, yield, & composition of agronomic crops; (4) study effect of soil & air temperatures, & relative humidity as modified by supplemental irrigation on physiological responses of the agronomic crops; & (5) learn possible effects of deposits of Fe & Mn from sprinkler applied irrigation water upon the physiology of some agronomic crops.

Agron. 392

Ark. The Response of Winter Small Grains to Management Practices. Compare methods of seedbed preparation, e.g., summer fallow, complete preparation, & scratching. Learn factors contributing to negative association of winter rainfall & yield, especially wheat, & positive association of March & April rainfall with oat & barley yields. Compare hay & grain yield of a non-winterhardy oat variety sown in December with a spring sown variety. Learn effects of different crops seeded with winter oats on yields of forage in fall & winter months, e.g., sudan. Learn quality of hay from fall & spring sown oats cut at different stages of maturity.
Agron. 410

Colo. The Influence of Irrigation Practices on Soil Structure and Plant Growth. To learn effect of methods of (1) application of irrigation water on moisture distribution, surface crusting, & plant emergence & growth; (2) land preparation for irrigation & effect of subsequent tillage operations on soil tilth.
Agron., Agr. Engin., Soils 17

Fla. The Effect of Cu, Mn, Zn, B, S and Mg on the Growth of Grain Crops, Forage Crops, Pastures and Tobacco. A liberal, uniform, basic treatment of N,P,K, Mg and the sulfate ion will be applied, superimposed by lime and aeration, singly and in combinations. Also a light basic treatment of the minor elements will be applied and the other treatments varied to determine whether Mg or S are deficient.
Agron. 440

Ga. Effect of Various Rotations on Yield of Crops. To compare yield of annual crops in a 3-year rotation following 3 years of Coastal Bermuda grass & crimson clover, 3 years of soybeans & crimson clover, 3 years of alfalfa, & 3 years of annual crops.
Agron. 24

Ga. The Effect of Varying Soil-Management and Cropping Practices upon the Fertilizer Requirements of Small Grains. To determine (1) most profitable rates & ratios of fertilizer for small grains on different soils, following continuous cropping, & in rotation with legumes; (2) effects of disease on yield of small grain under continuous cropping system & (3) yield interaction between varieties & fertilizer.
Agron. 28

Ill. Morphological Studies of Certain Agronomic Crops. To study (1) morphological development of corn, wheat, oats, soybeans, etc. & describe initiation & development of primordia of parts of plant; (2) cycle of development of above in different seasons & under different growing conditions, learn when different stages of development of plant occur & duration of each stage; (3) morphological characteristics of above in relation to corn & stem rust, strength of stalk or stem, & other agronomic characteristics; (4) developmental morphology of certain aberrant types of corn, wheat, oats, soybeans, etc.
Agron. 15-374

Ill. The Nutritive Value of Grains Grown upon Rich and Poor Soils. Separation insofar as possible into sound, unsound, & chaffy or shriveled portions, hand dissection of representative samples into the different anatomical parts, & finally the chemical analysis of representative whole grain samples & of anatomical parts of grains, involving besides the ordinary proximate analyses, analyses for such individual inorganic nutrients, including vitamins.
Anim. Sci. 20-355

Kans. The Temperature Relations of Crop Plants. To study (1) varieties of crops and segregates of hybrids for resistance to low and high temperature; (2) influence of environmental conditions on degree of resistance to extremes of temperature; (3) fundamental basis of resistance to high temperature; and (4) relation of varying degrees of relative humidity to high temperature resistance of plants.
Agron. 157

Kans. Lodging and Shattering of Grains and Seeds. Develop field practices & varieties by which the losses caused by lodging & shattering can be reduced. Learn the influence of water, particularly the effect of time & amount of irrigation, on lodging & shattering; learn the relation of nutritional conditions to the control of lodging & shattering; study the structure & composition of the stem & head that may be related to lodging & shattering; study the influence of light on the tendency to lodge; develop techniques for evaluating resistance to lodging & shattering.
Agron. 474

Kans.

Crop Rotations and Soil Productivity. (1) Learn effect of legumes on cereal crop growth. (2) Apportion legume's effect to this crop's N fixing ability, to its ability to improve soil physical conditions, & to other characteristics. (3) Ascertain if legume effect can be matched or exceeded in straight cereal rotations or monocultures, to which adequate fertilizer applications are made. (4) Learn if use of good soil management practices other than use of crop rotations can cause production of optimum yields of common cereal crops when grown continuously.

Agron. 504

Maine

Variety Testing, Cultural Practices and Fertilization of Small Grains. (1) Develop small grains by introduction, selection & testing. (2) Learn best fertilizer applications, row spacings, seeding dates, & other cultural practices needed for most efficient small grain production.

Agron. 73 Coop. ARS

Mich.

The Use of Several Tillage Methods for the Preparation of Seed Beds for General Agricultural Crops. The effect of various methods of seed bed preparation on the resulting agricultural crops as to yield & quality will be studied. Observations will be made of the effect on the physical properties of the soil. Time & labor requirements of these methods will be recorded, & the power requirements of the several methods studied. Corn, beans, oats, & beets will be used.

Agr. Engin. 7

Mich.

Relationship of Soil Nutrient Balance on Quality as Indicated by Composition of Crops Grown on Organic Soils. To determine (1) varietal interaction of crops to plant nutrient requirements; (2) interaction of protein and amino acid content of crops to soil nutrient levels; (3) effect of soil nutrient levels on cation and anion constancy, and vitamin content of crops; and (4) relationship of soil tests to crop composition.

Soils Sci. 119

Miss.

Mulch Farming Requirements. To study (1) equipment needs and adapt or design equipment satisfactory for producing crops in mulch; (2) crops, spacing and fertilization needs of said crops for economical production by mulch methods; and (3) additional water requirements for crops, if any, due to mulch type farming.

Agr. Engin. HB-2

Miss. Small Grain Production as Affected by Fertilizer Rates, Fertilizer Placement and by Stand. To learn efficiency of phosphate for (1) forage production as affected by banded & broadcast applications, & by ammoniation; (2) grain production as affected by time & method of application; (3) Learn yield of grain & extent of lodging as affected by conventional row seeding & restricted broadcast seeding at variable rates of seeding & at varying N levels.
Agron., Soils HD-5

Miss. Investigations on Winter Hardiness: Studies on Certain Physiological and Pathological Aspects of Freezing Injuries of Small Grains. Physiological studies: effect of some electrolytes & other diffusable substances on degree of freezing injury. Pathological studies: Predisposition of small grains to action of root parasites following exposures to freezing temperatures.
Pl. Path. HL-3

Miss. A Study of the Influence of Small Grains as Winter Green Manure Crops on the Growth, Quality, and Yield of Vegetable Crops. (1) Learn value of small grains as winter green manure crops. (2) Compare results obtained from plots planted to small grain to ones using animal manure, & to bare plots. (3) Learn influence of small grains on amount, kind, & time of application of commercial fertilizers for maximum yields.
Hort. HZ-3

Mo. The Effect of Deep Fertilization on Runoff and on Yield of Corn, Wheat and Alfalfa. To determine (1) yield effect of N in subsoil with & without deep placement of other plant nutrients; (2) effect of deep treatment from field sized terraced areas; (3) optimum depth & method of treatment.
Soils 70 Coop. ARS

Mo. Crop Sequences and Continuous Cropping as Affected by Legumes and the Fertility of the Soil.
Soils 117

Mo. Continuous Cropping vs. Crops in Sequences of Various Length. To (1) produce corn, small grains, and forages on experimental plots where these crops are grown continuously and in various combinations; and (2) study established plots to determine crop production and soil effect.
Soils 117-a

Mo. Research in the Control of Weeds.--I. Control of Weeds (Including Woody Plants) in Pastures and Meadows, and II. Control of Weeds in Corn, Cotton, Cereals, Soybeans. To reduce the damages to pastures, corn, cotton, cereals, & soybeans, caused by weeds in their many & varied ill effects.
Field Crops, Agr. Engin., For. 156 I & II Coop. ARS

Mo. Fertilizer Applications for Farm Crops. To study (1) effect of fertilizer materials on yield and composition of farm crops; (2) effect of plant nutrient additions on soil properties; and (3) use of mixed liquid fertilizers.
Soils 178

Mo. The Use of Water in the Production of Field Crops. To learn the effect of irrigation on yield & quality of (1) corn grown under different levels of fertilization; (2) cotton grown under different levels of fertilization; (3) soybeans; (4) pastures for beef cattle, & (5) forage crops.
Soils, Anim. Husb., Agr. Engin., Ent. 204 Coop. ARS

Mont. The Control of Annual and Biennial Weeds in Field Crops. To (1) control annual & biennial weeds in grain crops by use of selective herbicides; (2) control annual weeds in row crops such as beans, peas, & sugar beets; & (3) evaluate new herbicides for control of annual & biennial weeds.
Agron., Soils 881 Coop. USDI-Bureau of Reclamation

Nebr. Crop Rotations. To determine performance of various standard farm crops grown in rotation with and without legumes and barnyard manure. The comparative rotation value of sweetclover, red clover, alfalfa, and soybeans will be studied
Agron. 22

N.Y. (Cornell) An Investigation of Methods for Improving the Quality and Economy of Production of Feed Crops in the Principal Soil and Climatic Regions of New York State.--III, Small Grain Investigations. Field trials with fertilization, spacing, seed treatments, and varieties in various combinations will be performed at several places and on both oats and wheat.
Pl. Brdg., Pl. Path., Agron. 46-III

N.Y. (Cornell) An Investigation of Methods for Improving the Quality and Economy of Production of Feed Crops for the Principal Soil and Climatic Regions of New York State.--V. Crop Rotations for Dairy Farms. To (1) compare as to economy of feed production, 3 main types of rotations: those producing primarily roughage, those producing the balance of grain of roughage needed for economical milk production, & those producing primarily grain; (2) determine proper time to fertilize, kind of fertilizer, & amount to use when fertilizing a rotation; & (3) determine value of manure in various cropping systems.
Agron. 46-V

N. C. Planting Methods and Machinery. (1) Evaluate effects of components of planting machinery in terms of physical environmental factors, seed germination & plant development. (2) Develop planting equipment that will fulfill optimum conditions for emergence in an effective & economical manner as determined under above objective.
Agr. Engin. 13 (S-2) Coop. ARS (Also see Part 3, Section b.)

N. C. Weed Control in Corn, Sorghum, Tobacco, Small Grain, Horticultural Crops, and the Specific Control of Bermuda Grass and Wild Garlic. To develop (1) field production practices to more efficiently control weeds in corn, sorghum, tobacco, small grain, & horticultural crops, & methods for Bermuda grass & wild garlic; & (2) basic principles & practices involved in satisfactory farm use of above methods.
Field Crops H-59

N. C. Factors Influencing Crop Stands. To study the influence of (1) certain preplanting environmental factors upon seed viability, and the vigor and general growth of resulting seedlings; & (2) soil environmental factors upon seed germination & seedling development.
Field Crops H-62

N. C. Soil Fertility and Cultural Practices in Small Grain Production. To study (1) N fertilization & other needs of small grain as related to preceding crop & soil characteristics, & (2) effects of sources of phosphorus on growth & yields of small grain & the following crop of lespedeza.
Soils H-114 Coop. TVA

N. C. The Development of the Root System of Plants as Influenced by the Environment. To (1) characterize root systems of agriculturally important species and their varieties in order to determine certain aspects that may be used to differentiate their adaptation; (2) determine change in root distribution that may occur due to differences in soil properties and management practices; and (3) determine effect of any interaction that may occur within various pure and mixed plant populations.
Soils, Agron. H-120

Ohio

Potash and Nitrogen Requirements of Corn and Oats as Affected by Sweet Clover and Other Crop Residues. To determine (1) rate of potash fertilization required to maintain crop yields where sweet clover is used as green manure for corn; (2) comparison of sweet clover & chemical N as sources of N for corn, alone & in combination with crop residues; & (3) influence of sweet clover alone & in combination with residues on the supply & release of soil potash at different rates of K fertilization.

Agron. 26

Ohio

Effect of Crop Rotations in the Incidence of Diseases Caused by Soil-Borne Pathogens and Associated Changes in Soil Fungus Populations. To determine (1) effect of rotation on incidence of diseases caused by soil-borne pathogens from relative amountsof damping-off & root rots of assay plants, (2) effect of rotations on numbers & types of soil fungi, & to correlate those changes with disease incidence, (3) host range of soil pathogens on field crops important in Ohio, & study antibiotic & antagonistic relationships, soil types, fertilizers, & organic matter which may affect their pathogenicity.

Bot. 63-1

Ohio

Eradication or Control of Weeds and Other Undesired Plants.--I, The Chemical and Cultural Control of Weeds in Field Crops. To study (1) use and effectiveness of chemicals alone and with tillage in weed eradication compared with tillage alone and rates, dates, and methods of application of chemicals for maximum effectiveness on weeds and minimum injury to crops; (2) effects of herbicides on seed germination, composition, palatability, and other important properties of crop; (3) reaction of different varieties of crops to herbicides; (4) to devise specific systems of treatment for major noxious weeds of the state, using chemical, mechanical, and crop competition methods or combinations of them; and (5) to study relation of crop rotations to weed control.

Agron. 71-1 (NC-10) (Also see Part 24.)

Pa.

The Influence of Various Fertilization Practices on Crop Yields and Crop Quality in Rotations. To determine most desirable fertilization practices for obtaining maximum yields and quality of each crop in a corn, small grain, and hay rotation consistent with efficiency production.

Agron. 1100

Pa.

Forage and Grain Production of Winter Small Grains as Influenced by Fertilization and Management Practices. To investigate: (1) value of winter small grains as dual purpose crops; (2) management and fertilization practices for maximum forage production with minimum reduction in grain yields; (3) nutritional value of forage produced, and (4) if animals grazing such grains cause harmful soil compaction.

Agron., Agr. Biol., Chem. 1124

S. C.

Irrigation of Field Crops Under Different Tillage Methods of Utilizing Plant Residues, and the Effects of These Treatments on Runoff, Erosion, Soil Properties, and Yield. To learn (1) effects of irrigation under various tillage methods of handling plant residues on runoff, erosion, nutrient losses, yields, & soil properties; & (2) effect on placement of N fertilizer under various treatments.

Agr. Engin., Soils 130 Coop. ARS

S. Dak.

The Influence of Aeration and Mechanical Impedance on Crop Yields. Learn physical properties of soils affecting aeration, & mechanical impedance & tolerance limits of these physical properties that influence plant growth.

Agron. 304 (NC-17) (Also see Part 21, Section a.)

Tenn.

The Effects of Subsoiling, in Addition to Ordinary Plowing and Disking, on Crop Yields and Moisture and Organic Matter Content of the Soil. To compare effects of following tillage treatments on yields of crops in rotation: (1) ordinary turning; (2) subsoiling & turning; & (3) subsoiling & deep disking; & determining influence of tillage treatments on soil moisture levels & organic matter content.

Agron. 41

Vt.

The Mode of Action of Plant Growth Hormones. Study the effect of (1) auxin on the metabolism of oats, corn, sunflower & other plants; (2) Giberellin on metabolism of oats, corn, sunflower & other plants. (3) Attempt to formulate a theory on mode of action of these compounds.

Agr. Biochem. 46

Va.

Comparison of Several Rotations with Varying Rates of Fertilization. To (1) study effect of several legumes on succeeding crops in rotation, (2) compare feed production from several rotations & alfalfa continuously, (3) compare effect of two rates of fertilization on each rotation, (4) study effect of several rotations on certain physical & chemical properties of soil, & (5) study effect of several rotations & two fertility levels on incidence of disease.

Pl. Path. & Physiol., Agron. 86011

W. Va. Crop Rotation Experiments. To determine (1) efficiency of various cropping systems in production of feed per acre; (2) effect of soil fertility level on efficiency of production of various cropping systems; & (3) effect of cropping system on physical, chemical, & biological properties of soil.

Agron. 43

Wyo. The Effect of Cropping Practices on Yield and Some Physical and Chemical Properties of the Soil. To (1) learn effect of continuous cropping & alternate crop & fallow on yield of winter wheat, spring wheat, oats, barley & corn; (2) learn effect of kind of crop & continuous vs. alternate crop & fallow on certain physical & chemical properties of soil: (3) compare effect of crested wheat, alfalfa, & a mixture of them in maintaining soil N & organic matter content & yield in 12 year rotations with corn, spring wheat & oats; (4) compare effect of manure vs. no manure in continuous cultivation on N, organic matter content, & soil physical properties; & (5) compare effect of continuous cultivated rotations vs. sod crops in rotation on yield & chemical & physical soil properties.

Agron., Chem. 539

C. Harvest, Storage, and Processing

Ala. Grain and Forage Harvesting, Processing and Storage. To develop improved methods & to adapt equipment for (1) harvesting, conveying, drying, storing, mixing, grinding, & feeding grains, (2) harvesting, conveying, drying, storing, mixing, grinding, & feeding hay crops that will reduce labor requirements & processing costs & improve hay quality, (3) feeding silage crops that will reduce labor & processing costs & improve silage.

Agr. Engin., Hort. 572

Alaska Facilitating Marketing of Alaska's Cereal Grains. (1) Study equilibrium moisture content of barley, oats, & wheat stored under Alaska's environmental conditions. (2) Determine a safe moisture content for these grains. (3) Examine organisms causing deterioration of stored grains & study effect of these organisms on germination, weight loss & nutritive value. (4) Explore commercial use of a batch dryer developed by the Alaska Agricultural Experiment Station. (5) Explore effectiveness & economics of forced air bin drying at rates of 6 & 12 cfm. per bushel.

Agr. Engin., Agron., Pl. Path. 56 II, ES 448

Ark. Improving Protein Efficiency of Cereal Grains with Amino Acids. To improve quality of proteins of plant foods such as cereal grains by adding amino acids which are deficient.
Agr. Chem. 355

Idaho Bionomics of Stored Grain Insects Affecting the Marketability of Grain in Storage. To (1) determine stored-grain insects affecting marketability of grain & economic importance in farm & elevator storage; (2) determine factors affecting insect populations in farm & elevator grain storage; (3) study life histories of more important stored-grain pests under conditions existing in farm & elevator storage especially as they relate to control of such insects in grain for market; & (4) determine economic significance of stored-grain insect populations.
Ent. 286 (WM-16) (Also see Part 7, Section c.)

Ill. Removing and Metering Small Grains and Supplements from Bulk Farm Storage. To develop methods & design equipment for removing small grains & supplements from bulk storage at variable but controlled rates for combining in feeds.
Agr. Engin. 10-351 (NC-23) Coop. ARS (Also see Part 3, Section b.)

Ind. Determination of Drying Rates of Grains in Bulk Air Drying Systems. To (1) determine heat requirements for vaporization of grain moisture; (2) determine maximum drying rates as limited by characteristics of grain (exposed drying rates); and (3) develop methods to predict rates of drying of successive layers in a bulk of grain as influenced by system variables.
Agr. Engin. 273

Ind. The Relation of Drying and Storage Practices to the Deterioration of Grain. To learn (1) relation of ventilation rate & weather to deterioration of grain during drying; (2) effect of moisture content & conditioning methods used on deterioration of ear corn in storage & (3) effectiveness of & needs for low volume ventilation to prevent damage to stored grain & related products.
Agr. Engin., Agron., Biochem. 742 Coop. ARS

Ind. Mold Deterioration and its Effect on Losses of Wheat and Corn in Storage. (1) Identify fungi present in stored wheat & corn & learn their effect on quality, grade, & condition of grain. Learn (2) moisture contents of stored grains & the temperature & time required for various levels of activity of deleterious fungi; (3) When fungi, important in storage losses, invade wheat & corn seeds.
Bot., Pl. Path. 930 Coop. AMS

Iowa

Handling Grain Through Harvest, Drying and Storage. To evaluate comparatively on basis of capital requirements, operating costs & labor methods of handling grain from harvest through drying & storage. To develop & test a palletized system of handling grain from harvest through drying & to storage in relation to those methods now available. To develop, test & evaluate other new methods of handling grain which may become apparent during these studies. To examine design of grain drying installations in relation to harvesting machine capacities & performances.
Agr. Engin., Econ. 1295 Coop. ARS

Iowa

Farm Storage and Conditioning of Grains. (1) Learn if mechanical ventilation will control moisture migration & insect infestation in farm stored grains, minimum bin size in which mechanical ventilation is beneficial, & which methods & equipment for mechanical ventilation will produce desired results most effectively. (2) Learn pressures exerted by bin walls, floors, structural members & parts (as ducts), by stored grain. (3) Learn if heated or un-heated air is more effective in drying grains. Study includes design of drying compartments & duct systems in bins, distribution of air in drying grain, selection of grain quality to drying process, & relation of cost to process & equipment. (4) Coordinate drying equipment & drying methods with production, harvesting, & handling equipment & methods.
Agr. Engin., Agron. 1296

Kans.

Insects Affecting Stored Grain and Milled Grain Products. To (1) study biology & behavior of grain & milled grain products insects, (2) develop methods for distinguishing insect fragments in milled grain products, (3) determine effects, of new insecticides on grain infesting insects, & (4) study insect problems in farm stored grain.
Ent. 322

La.

Rice, Small Grain and Grass Seed Harvesting, Handling and Drying. To (1) determine most economical & efficient methods of harvesting, (2) determine cause & remedy for checking & breaking of grains, & (3) develop low cost farm storage & driers.
Agr. Engin. 501

Minn.

Mechanism of Drying in Cereal Grains. (1) Study mechanism of moisture movement in drying of individual kernels of shelled corn; (2) rate at which moisture is removed from individual kernels while drying. (3) Learn diffusion coefficient for movement of water within kernel.
Agr. Engin. 1213

Minn. *A Study of Factors Influencing the Keeping Quality and Processing Value of Grain.--1. Biochemical and Microbiological Factors Involved in the Respiration, Storage Behavior and Industrial Value of Grains and their Mill Products. 2. Effects of Methods of Drying Grain on its Processing Value.* To (1) determine significance of moisture, temperature, microflora, etc. on industrial value, respiration, heating and spoilage of grains and their mill products; (2) investigate underlying factors in deterioration of grain and its products in storage; (3) study methods to minimize deterioration in storage; & (4) establish conditions under which grains may be artificially dried with minimum deleterious influence on viability & processing values.
Agr. Biochem. 1504

Minn. *Storage of Grain in Various Atmospheres in Sealed Bins.* To learn effects of various atmospheres on the microbiological, entomological, & biochemical factors that influence the quality of stored grains, especially wheat, corn & soybeans.
Agr. Biochem. 1517

Minn. *Cause and Control of Biological and Chemical Deterioration of Agricultural Products in Storage.--I, Soybeans, Corn and Cereal Grains.* To determine (1) mold population of commercial lots of corn soybeans, and cereal grains of different market quality; (2) main factors influencing growth of molds on storage grains; and their effects; (3) if mold assays might be useful as additions to criterium of quality; and (4) which promising compounds can be used as inhibitors of molds on stored seeds.
Pl. Path., Bot. 2220-1

Mo. *Grain Drying.* To (1) study operating characteristics of grain drying systems, with emphasis on distribution of air in grain mass; and (2) obtain further data on conditioning of ear corn with unheated air.
Agr. Engin. 225

Mont. *Improvement of Combine Harvesters.* Improve small grain harvesting machines thru adaptation of different principles for cutting, threshing, & separation: to reduce power requirement & grain loss, to simplify separation mechanism, to reduce manufacturing cost.
Agr. Engin. 1018

Nebr.

The Use of Tempered Air for Conditioning Grain in Bulk Storage. To compare rates of drying, energy requirements for drying, weight changes & differences in quality when grain is conditioned in bulk storage by forced circulation of (1) untempered ambient air, (2) ambient air tempered to a relative humidity of 50% by recirculation of moist air in periods of low ambient humidity, (3) ambient air tempered to maintain relative humidity between 50% & 60% by recirculation of moist air in time of low ambient humidity & addition of heat during time of high ambient humidity.

Agr. Engin. 498 (NC-23) Coop. ARS (Also see Part 3, Section b.)

N. Dak.

The Effect of Forced Air Drying on the Quality of Malting Barley and Durum Wheat. To learn effects of drying with forced air at different temperatures on (1) germination & malting quality of barley, (2) milling & macaroni processing quality & germination of durum wheat.

Agr. Engin., Cereal Technol. 4-7

N. Dak.

Insect and Rodent Contamination of Cereal Grains. Learn (1) kind, degree, time, & place of contamination of wheat & barley that occurs between standing crop, & freight car, particularly the on-farm contamination; (2) how contamination is related to harvesting methods & storage facilities used in different crop production areas of state; (3) factors associated with prescence of contamination & variability of these factors in different ecological situations.

Ent. 5-6, Coop. USDI

N. Dak.

An Investigation of the Susceptibility of Starches to Attack by Alpha-Amylase. To develop a reliable method for estimating alpha-amylase activity of ungerminated cereals, especially barley, thru study of effect of starch gelatinization temperature & retrogradation upon alpha-amylase activity, & salts & proteinase activators influence on alpha-amylase of ungerminated barley. Irrigation influence upon amylolytic susceptibility of barley starch will be studied.

Cereal Technol. 10-3

Ohio

A Study of the Harvesting and Storing of Corn and Small Grains. To study the Ohio grain crops in regard to the factors which insure good harvestibility & storage. I. Corn. To (1) study how mechanical picking quality is influenced by various plant factors; (2) evaluate influence of weather, time of day, stage of maturity, & machine adjustment on quantity of shelled corn, husks, & silks; (3) build & test cleaning & distributor equipment to eliminate or distribute in crib the shelled corn, husks, & silks; (4) study basic shellage actions by which corn may be shelled in an effort to find a method by which immature corn may be shelled without excessive damage to the kernel; & (5) thru temperature & air flow patterns, to evaluate various crib loadings which result from distribution equipment, various machine types, various crib designs, & different degrees of cleaning. II. Wheat. To (1) establish procedure for comparing & rating wheat varieties for combining characteristics; (2) determine plant factors influencing satisfactory harvesting; & (3) make recommendations for possible machine changes which will aid harvesting. III. Soybeans. To (1) evaluate present & new varieties for field harvestibility, & (2) evaluate items 2 & 3 under wheat for soybeans.

Agr. Engin., Agron. 82

Oreg.

Controlling Pests of Stored Grain and Stored Grain Products. To (1) determine nature, extent, and species involved in stored grain insect problem in Western Oregon, which area would typify a marine west-coast type of climate; (2) acquire biological and ecological data on insect infestations in stored grain in Western Oregon which differ in type or intensity from infestations in other areas; and (3) use information from foregoing sources to prevent or control infestation in western Oregon and similar areas.

Ent., Farm Crops 99-5 (WM-16) (Also see Part 7, Section c.)

Pa.

Air Distribution in Drying Hay and Grain. To (1) improve performance of hay and grain driers by studying ways of getting better distribution of air thru material being dried; and (2) develop improved technique for measuring air distribution in hay and grain.

Agr. Engin. 1198 (NE-13) (Also see Part 3, Section c.)

S. Dak. The Use of Crop Drying and Crop Conditioning Machinery and Equipment for South Dakota Crops. (1) Test practicability of conditioning wheat in storage by small electric motors & single air distribution ducts. (2) Develop equipment for coordinating & comparing drying of crops in typical farm buildings. (3) Equip a building & arrange equipment suitable for controlled drying tests on grain & hay crops. (4) Make available all crop drying equipment for careful research tests & for drying of crops under field conditions.
Agr. Engin., Agr. Econ. 246 Coop. CCC

Wash. Control of Insect Pests of Stored Grain. To (1) evaluate chemical grain protectants for control of wide range of stored grain insect pests which occur in the Pacific Northwest; (2) evaluate insecticides as residual sprays on walls of storage facilities; (3) evaluate grain losses incurred by each of important grain infesting species; (4) conduct intensive survey to trace seasonal development of insect population in storage facilities, to evaluate role of sanitation practices, & attempt to correlate insect infestations with type of storage unit construction; & (5) conduct other pertinent studies on stored grain insects.
Ent. 1127 (WM-16) (Also see Part 7, Section c.)

W. Va. Determination of Factors Influencing the Drying Rates of Grains. To determine (1) limitations on removing moisture from grain, (2) critical temperatures, air volumes, humidities, air velocities, time factors, & (3) effect that drying conditions have on germination.
Agr. Engin. 15

Wis. Design and Operation of Improved Crop Drying Structures. To investigate & develop procedures for conditioning & storing forage, small grain & corn crops with the least manual labor & at the same time produce excellent quality livestock feed at a minimum cost.
Agr. Engin. 915 Coop. ARS

D. Diseases and Insects

Ala. The Control of Insects Attacking Corn and Grain Sorghum. To (1) study factors affecting seasonal abundance of important insect pests; (2) cooperate with plant breeders in selecting varieties and strains resistant to attack, particularly the rice weevil; and (3) develop control measures for use in the field and in storage.
Ent., Zool. 314

Ark. Biology and Control of Certain Important Diseases of Oats and Wheat in Arkansas. To (1) develop new or better methods of prevention & control of certain important diseases of oats such as crown rust of oats, leaf rust of wheat (old & new races), oat smuts (old & new races), Helminthosporium leaf spot, virus diseases, etc.; (2) identify causal agents & study life cycle & epidemiology of different parasites, except anthracnose, including identification of different races whenever they may be involved; & (3) breed varieties of oats & wheat that will be resistant to these diseases & be otherwise desirable.
Pl. Path., Agron. 324

Calif. Biochemical and Physiological Aspects of Disease Resistance Inherited by Plants. To study intensively chemical composition of selected strains & varieties of important crop plants relative to resistance of specific diseases.
Agron., Pl. Path., Bot. 1552

Calif. Investigation of the Nature of the Virus Diseases of Cereals & Leguminous Crops in California with Reference to Transmission, Variability, Effect on Yield, Host Range and Varietal Reaction. To learn (1) interrelation of recognized viruses of wheat, oats & barley, (2) nature of other viruses & virus-like diseases of cereals & grasses & their relation to native & cultivated grasses, (3) viruses in alfalfa, clovers & other legumes by identification, (4) methods of dissemination & relative economic importance of viruses upon legumes being grown for forage & seed production, (5) correlate studies with Agronomy Department.
Pl. Path. 1652 Coop. FES

Colo. Inheritance Studies on the Disease Resistance in Small Grain. To (1) study inheritance of small grain disease resistance; & (2) use the facts obtained in the production of disease resistant varieties with high yield & quality.
Agron. 10

Del.

The Control of Plant Parasitic Nematodes by Host Resistance, Cultural Practices, and Chemicals. (1) Learn effect of cultural practices & chemical treatment of soil on: inoculum potential of phytopathogenic nematodes present in Coastal Plain soils; incidence & severity of plant diseases caused by these organisms; subsequent growth of crop plants. (2) Develop soybean & grain varieties possessing resistance to prevalent species of root-knot nematodes in Coastal Plains soil, & learn mechanism of this resistance.

Pl. Path. 15-P (NE-34) Coop. ARS (Also see Part 17, Section a.)

Ga.

Evaluating Small Grains for Resistance to Major Diseases. To screen varieties and breeding strains developed by Cooperators in Georgia and other states for resistance to: viruses of oats, crown rust of oats, leaf rust of wheat and powdery mildew of wheat.

Agron., Pl. Path. 31 Coop. ARS

Ga.

Diseases of Small Grains. (1) Assist agronomists in evaluating small grain varieties & breeding material for disease resistance. To learn (2) nature & importance of nematode damage & other new diseases on small grains; (3) effect of seed treatment in relation to seed quality & planting date on stands, yields, & disease control.

Pl. Path. 104 Coop. ARS

Idaho

Biology, Ecology and Control of Insects Affecting Dryland Cereals. To (1) survey dryland grain growing areas to determine insect species present, their abundance & economic importance; (2) make detailed studies on life histories of those found to be major pests; (3) make detailed studies on ecologies of major pests to find how ecological factors influence their abundance & degree of economic damage; & (4) develop practical control measures for all major economic species.

Ent. 267

Iowa

The Development and Increase of Superior, Disease Resistant Varieties of Barley, Wheat and Flax. To (1) direct hybridization and selection work toward developing varieties of barley, wheat, and flax best suited to maximum production in certain areas of the state; (2) test and evaluate new hybrids in early generations at northern and western outlying stations; (3) to obtain additional and more critical information on value of bulk and pedigree methods of breeding barley; (4) investigate effects of newer types of drying equipment on malting quality of dried barley; (5) test new accessions of barley in the field to locate disease resistant germ plasm; (6) observing new germ plasm derived from breeding program for susceptibility & resistance to disease; (7) determine importance of diseases in wheat production in Iowa, especially spread of wheat mosaic; (8) develop new & more simple technics for producing disease epiphytotics.

Farm Crops, Bot., Pl. Path. 1177

Iowa

Entomological Problems Involved in Corn and Other Field Grain Storage. To (1) test insecticides against corn and feed-grain pests under conditions of temperature, humidity, and other factors prevailing in practical storage; (2) discover more effective and cheaper fumigants and easier and safer methods of using them; (3) study effect of size, shape, construction, and ventilation of storage structures on dynamics of populations of stored grain pests; and (4) study interrelations between insect infestation in stored grain, heat and moisture production, and prevalence of and spoilage caused by fungi.

Zool., Ent. 1257

Ky.

The Biology and Control of Mites and Armyworms Attacking Cereal and Forage Crops. To (1) learn mite species involved in various crops & evaluate economic importance; (2) study relationship of various mite population with reference to insecticide(s) used; (3) study influence of mite predators or other biological control factors on population; (4) evaluate acaracides & make recommendations on control; (5) study causes of armyworm outbreaks & possibilities for predicting infestations; (6) study control methods & evaluate insecticides for effective control; & (7) make residue studies of treated crops.

Ent., Bot. 454 (S-25) (Also see Part 7, Section c.)

La.

Soil-Borne Diseases of Forage and Cereal Crops in Louisiana. To determine factors, both pathological and physiological, influencing growth of oats, lespedeza, vetch, alfalfa, winter peas, etc.

Pl. Path. 559

Md.

Breeding for Mildew Resistance in Winter Barley and Wheat. To (1) contribute to the study of genetics of resistance to powdery mildew, *Erysiphe gramines hordei*, (2) devise or improve methods for creating artificial epidemics of the disease useful in evaluating breeding material and in estimating damage from the disease, & (3) breed superior varieties of winter barley & winter wheat having a high degree of mildew resistance.

Agron. B-69 (NE-23) Coop. ARS

Minn.

Rusts of Cereals.—8, Physiologic Specialization in Cereal Rusts. To determine (1) number, distribution, pathogenic capabilities, & population shifts of physiologic races of *Puccinia graminis*, & other important cereal rusts, & (2) how often new physiologic races arise & their pathogenicity for cereal varieties.

Pl. Path., Bot. 2209-8

Minn. Rusts of Cereals.--9, Epidemiology of Cereal Rusts. To (1) determine the conditions under which inoculum of cereal rusts, particularly Puccinia graminis, is carried from north to south and south to north by the wind; and (2) obtain further information regarding long-distance spread of stem rust from barberry and crown rust from buckthorn, method by which Puccinia graminis survives under different winter conditions, and factors affecting the development of epidemics of stem rust.
Pl. Path., Bot. 2209-9

Minn. The Nature and Variability of Plant Disease Resistance--I, Wheat and Other Small Grains. To determine (1) whether resistance is due to functional, morphologic, or physiologic characters or various combinations of the three; & (2) to what extent resistance of crop plants varies with stage of development, environmental factors, & biotic factors such as relation between host & pathogens.
Pl. Path., Bot. 2214

Minn. Epidemiology of Leaf Spots and Other Foliage Disease of Crop Plants.--II, Corn and Small Grain Diseases. To determine number, prevalence, and distribution of physiologic races of important pathogens that cause foliage diseases of corn and small grains and also the relative importance of such diseases in breeding disease-resistant varieties.
Pl. Path., Bot. 2219-2

Mo. Investigation of the Biology and Control of Field Crop Insects. To (1) make studies of life histories & seasonal abundance of important insect pests of soybeans & learn population levels justifying insecticidal control, (2) apply soil insecticides to control soil-infesting insects, (3) make observations on soybean fields sprayed, (4) use new insecticides for control of bean leaf beetle, corn earworm, clover leaf worm, etc., (5) study control of legume insects with insecticides, (6) search for corn plasm resistant to Southwestern corn borer, (7) study migration of potato leafhopper, (8) study breeding field corn for resistance to corn earworm, (9) study uniform National Insecticide Control Test on corn earworm, (10) consider seed treatment with soil insecticides, (11) investigate control of Hessian fly, with insecticides, (12) collect & study parasites of European corn borer, (13) investigate soil insecticides on corn & small grains, & (14) study insecticidal control of grasshoppers.
Ent. 102

Mo.

A Study of the Diseases of the Field Crops of Missouri with Special Attention to Rusts and Smuts of Small Grains; and Leaf Blights and Stalk Rots of Corn. To (1) learn diseases of economic importance & describe new ones, (2) make crop yield loss estimates due to diseases, (3) learn resistance rating of present breeding lines, hybrids & varieties to common diseases, search for resistant types & cooperate with breeders, (4) learn optimum & limiting environmental factors for disease development & search for cultural control, (5) test established & newly developed chemicals & antibiotics for control, (6) study methods of inoculation for inciting epiphytotics & develop new methods for studying diseases of field crops.

Pl. Path., Field Crops 127 Coop. ARS

Mont.

Virus Diseases of Cereals. (1) Establish identity of viruses inciting specific diseases of cereals. (2) Study occurrence of various strains & complexes among viruses. (3) Establish identity of vectors spreading these diseases in Montana. (4) Learn epidemiology & economic importance of diseases. (5) Devise practical & economic control.

Bot., Bact. 38

N.Y.
(Cornell)

Diseases of Small Grains.--I. Crown Rust of Oats. 3. Dwarf Bunt of Wheat. 4. Stem Rust of Cereals. 5. Oat Smuts Investigations. 6. Loose Smut of Wheat. To (1) determine the nature of the diseases causing damage to oats, wheat, barley, & rye in New York; (2) establish techniques for proper screening of material for resistance; & (3) develop measures for control of diseases of small grains.

Pl. Brdg., Pl. Path. 132

N.Y.
(Cornell)

Diseases of Small Grains. 7. Cercosporella Foot Rot of Small Grains and Grasses. Study distribution, etiology, epiphytology, & control of Cercosporella foot rot of wheat and grasses.

Pl. Path. 132-7 (NE-23)

Okla. Investigations of the Biology and Control of Arthropods Attacking Small Grains. (1) Study resistance of small grain varieties to greenbug attack to learn superior germ plasm for breeding program. (2) Study insecticides to find materials less toxic to warmblooded animals, more effective at lower temperatures, more residual, more specific to injurious insects, & less expensive. Search for insecticides giving long lasting protection in seedling stage. (3) Learn most effective chemical control measures for brown wheat mite so recommendations can be made. (4) Learn effect of brown wheat mite on yield of wheat, barley, & oats. Study (5) effect of tillage, fertility, crop rotation, & variety of small grains on mite populations; (6) biology & ecology of mite so to compare conditions in this area with those in central portion of western plateaus area. (7) Learn effect of arthropods other than greenbug on yield of small grains & develop more effective methods for control.
Ent. 951

Pa. Development of Insect Resistance in Small Grains. (1) Survey & evaluate small grain varieties, including presently used Northeast varieties, for insect resistance. (2) Develop new or utilize known techniques for evaluating insect resistance & its inheritance in small grains. (3) Investigate effect of environment upon expression of insect resistance in small grains. (4) Incorporate insect resistant stock into small grain varieties as integral part of breeding program for superior agronomic & pathologic characteristics.
Zool., Ent., Agron. 1272 (NE-23) Coop. ARS

S. C. Diseases of Small Grains. To determine causal organisms, reaction of grain varieties, sources of infection and value of seed treatment and other control measures. 1. Loose smut of barley. 2. Scald of barley. 3. Adverse effect of soil conditions.
Bot., Bact., Agron. 9

S. Dak. The Control of Root-Rot Diseases of Barley and Winter and Spring Wheat. (1) Search for sources of resistance to root-rot pathogens. (2) Evaluate influence of crop sequence &/or soil amendments on population of root-rot pathogens. (3) Learn cause & symptomology of soil-borne pathogens. (4) Learn losses, prevalence, & distribution of soil-borne cereal diseases in state.
Pl. Path. 115

Tenn. *Root Diseases of Small Cereals, and the Nematode Relationship*. To (1) continue basic investigations of root disease-inciting organisms, as to occurrence, relative importance, pathogenicity, taxonomy, & influence of environmental factors; (2) seek control of certain cereal root diseases by means of breeding, cropping practices, & fungicides; & (3) study root disease-nematode relationship in cereals.

Pl. Path. 137

Tex. *Investigations of the Biology and Control of Greenbugs, Spider Mites and Other Insects Attacking Small Grains*. Learn occurrence, distribution, seasonal history, host plants, & their relationships, the influence of farm practices & environmental factors on greenbug & other aphids; several species of spider mites & other insects attacking small grains. Search for plant resistance to attack by greenbugs, mites, or other insects. Incorporate resistance to greenbugs available in certain Oriental barley varieties & in a selection of Dickinson wheat into varieties of barley & wheat adapted to Texas conditions. Study basis & causes of resistance. Determine effectiveness under field & laboratory conditions of commercial & experimental insecticides on control of said insects.

Ent. 1020 Coop. ARS

Tex. *Physiology of Rust Resistance in Wheat and Oats*. (1) Make systematic study of organic compounds in wheat & oat plants that may affect response of such plants to rust pathogens. Study (2) effects of fungicides, growth hormones, & related compounds that may modify host response to rust organism; (3) physiology of pathogen to establish better methods of distinguishing races or biotypes of organisms; (4) interaction of environmental factors as light & temperature on rust reactions & attempt to discover what compounds are being produced or changed as a result of changes in environmental factors.

Pl. Physiol., Pl. Path., Agron. 1114 Coop. ARS

Va. *Diseases of Barley, Oats, and Wheat and Breeding of Disease-Resistant Varieties*. To (1) develop varieties of barley, oats, & wheat resistant to rusts, smuts, powdery mildew, & other damaging diseases; (2) culture organisms causing the diseases, & learn effects of environment on them; (3) study histologically & physiologically the processes of diseases caused by these organisms; (4) study genetics of causal organisms & related cytological phenomena; (5) develop methods of control of small grain diseases & promote use of known methods; & (6) study inheritance of resistance to small grain diseases.

Pl. Path., Pl. Physiol., Agron. 86057 Coop. ARS

Wash. Investigations on Root Rots and Foot Rots of Cereals and Grasses in Eastern Washington. To (1) learn distribution, prevalence & economic importance of root & foot rots of cereals & grasses in Eastern Washington; (2) learn cause(s) of these diseases; & (3) develop control measures.
Pl. Path. 864

Wash. Virus Diseases of the Cereals and Grasses. Learn virus diseases of cereals & grasses in state, their distribution, prevalence & severity, cereals affected, forage & weed grasses harboring them, & pertinent factors in spread of disease. Develop resistant varieties or other control.
Pl. Path., Agron. 1280

Wash. The Influence of Specific Organic Compounds in the Soil Solution (Other than Anti-Biotics) on the Development of the Root and Crown Rots of Cereals and Grasses. Learn influence of specific organic compounds on development of root & crown rots of cereals & grasses (if they increase or decrease disease level) & if they influence formation of resting spores or other structures of survival formed by pathogens within diseased root & crown tissues.
Pl. Path., Soils, Agron. 1286

E. Economics and Marketing

Ark. An Economic Appraisal of the Marketing of Soybeans and Small Grains Grown in Arkansas. To (1) determine present areas of production, methods of marketing, availability, and location of marketing facilities, and location, type and cost of storage available for grain crops; (2) evaluate present methods of marketing and present marketing facilities for handling grain crops produced in Arkansas; (3) estimate present use of feed grains and their source of supply; and estimate future grain demands; and (4) investigate competitive position of Arkansas grown feed grains in terms of prevailing marketing methods and facilities and present and potential demand.
Agr. Econ., Rural Sociol. 375 (SM-11) Coop. FCS, AMS
(Also see Part 14, Section a.)

Ga. Georgia Grain Marketing Problems. To (1) describe & evaluate present methods of handling, distributing & using grains in Georgia; (2) evaluate grain prices in relation to prices in other areas, types of use, grade & quality, & seasons of year; (3) determine extent of quality deterioration by types of storage, & geographic areas as affected by methods of harvesting & management; (4) relate quality deterioration under different storage types to cost of storage & normal seasonal variations in price; & (5) evaluate present methods of storage & marketing in terms of probable alternatives as determined by results of this investigation.

Agr. Econ., Agr. Engin., Agron. 302 (SM-11) (Also see Part 14, Section a.)

Ill. Economics of Grain Storage. To analyze the economics of grain storage in order to make the storage facilities more effectively serve the needs of farmers, marketing agents, & consumers as well as to improve efficiency of the present & potential storage facilities. Also to (1) evaluate economic considerations influencing capacity, type & location of grain storage facilities; (2) learn economics of quality changes which occur under different methods & periods of storage; (3) analyze storage costs & factors influencing them under various alternative storage conditions; & (4) analyze & evaluate public grain warehouse legislation & administration in various states.

Agr. Econ. 05-355 (NCM-10) (Also see Part 14, Section a.)

Ill. The Expansion of Market Outlets for Illinois Grains, Soybeans, and Derived Products. (1) Provide a continuous current appraisal of status of supply & use of state produced grains, soybeans, & derived products. (2) Explore methods by which product use can be increased thru changes in pricing & marketing. (3) Learn factors affecting use of grains, soybeans, & derived products.

Agr. Econ. 05-358

Ill. The Economics of Pricing Arrangements for Grain and Soybeans. Learn & describe (1) precise manner in which prices of grains & soybeans are established; (2) process by which price expectations are formulated & bid into forward prices for speculative commodities. (3) Describe market influences & price differences affecting rate of use & prices of grains & soybeans. (4) Appraise effectiveness of speculative markets in stabilizing rates of use & prices of grains & soybeans. (5) Suggest changes in pricing arrangements to result in greater price stability. (6) Suggest methods by which farmers can better use existing pricing mechanism in their grain marketing activities.

Agr. Econ. 05-359

Ill. Pricing and Trading Practices for Grain in Illinois. Learn (1) & describe current spatial price patterns, associated grain movements & trading practices for grain in Illinois: (2) shifts that have occurred in spatial price patterns & trading practices since 1946 & their effects on grain movements; (3) & analyze causes of these shifts & to relate price pattern changes to changes in trading practices & grain movement. (4) Evaluate trends discovered as an aid in forecasting the direction of grain price patterns & grain movement changes over the next decade.

Agr. Econ. 05-372 (NCM-19) Coop. USDA (Also see Part 14, Section a.)

Ind. Price Patterns and Trading Practices for Grains in Indiana. Learn (1) present day locational price patterns & trading practices for grains in state; (2) what shifts have occurred in patterns & practices over the past decade & effects of changes on grain movements. (3) Analyze causes of shifts & relate where possible price pattern changes with trading practice changes. (4) Determine usefulness of findings for forecasting direction of changes in price patterns & grain movements over the next decade; make specific recommendations useful to grain trade.

Agr. Econ. 918 (NCM-19) (Also see Part 14, Section a.)

Ind. Causes of Imperfections in Local Indiana Grain Markets. To (1) determine variations in the relation between grain prices at terminal markets and at various local points in Ind.; (2) determine different local market conditions which explain variations found above; and (3) formulate possible corrective measures to attain more perfect local markets.

Agr. Econ. 701, ES 251

Iowa Analysis of Methods, Practices, and Costs of Storage and Marketing of Feed Grains and Soybeans, and the Processed Products of these Crops. To (1) learn relative economics of various methods & types of grain storage under alternative conditions; (2) learn most economic use for the several types & qualities of feed grains & their products; & (3) evaluate effectiveness of present grain marketing methods, facilities, & over-all structure in Iowa in view of current & anticipated trends.

Agr. Econ., Rural Sociol. 1224 (NCM-10) (Also see Part 14, Section a.)

Iowa

Pricing and Trading Practices for Grain in Iowa. To learn (1) & describe the present day spatial price patterns & trading practices for grain in Iowa; (2) shifts having occurred in these patterns & practices over the past decade & their effects on grain movements; (3) & analyze causes of shifts relating where possible price pattern changes with trading practice changes. (4) Assess trends discovered as an aid to forecasting direction of grain price pattern & grain movement changes in region over the next decade.

Agr. Econ., Rural Sociol. 1342 (NCM-19) (Also see Part 14, Section a.)

Kans.

Marketing of Grain and Purchasing of Feeds. To study (1) marketing of Kansas grain and purchasing of feeds; and (2) price movements and method of price determination of these commodities.

Agr. Econ. 143

Kans.

Pricing and Trading Practices for Grains in Kansas. Determine & describe current spatial price patterns & trading practices for grain in Kansas, what shifts have occurred in these over the past decade & their effects on grain movement; determine & analyze causes of these shifts relating, where possible, price changes with trading practice changes; assess discovered trends as an aid in forecasting the direction of grain price pattern & grain movement changes in the next decade.

Agr. Econ. 483 (NCM-19) Coop. AMS (Also see Part 14, Section a.)

Ky.

Economic Aspects of Storing and Marketing Grain in Kentucky. (1) Study volume & location of production, prices, marketing facilities, & outlets for grain. (2) Learn fixed & variable costs of country elevators of various capacities. (3) Study different methods of on-farm storage & comparative costs of these methods. (4) Compare the advantages of on-farm & off-farm storage in maximizing farmer net income from sale of grain. (5) Consider impacts which change in technology, changes in kinds & varieties of grain & changes in price-support have on marketing. (6) Analyze advantages & disadvantages of location on elevator operation.

Agr. Econ. 45

Minn.

Economics of Grain Marketing. To analyze: (1) supply, demand, & price relationships of grains that are of importance to producers, merchandisers, & processors in Minn.; & (2) pricing policies, costs, & margins of grain marketing firms.

Agr. Econ. 1125

Minn. Pricing and Trading Practices for Grain. To learn (1) & describe present day spatial price patterns & trading practices for grain; (2) what shifts have occurred in patterns & practices over past decade & their effects on grain movements in region; (3) & analyze causes of shifts, relating price pattern changes with trading practice changes. (4) Assess trends discovered as an aid to forecasting direction of grain price pattern & grain movement changes in region over the next decade.
Agr. Econ. 1132 (NCM-19) Coop. AMS (Also see Part 14, Section a.)

Miss. Marketing and Utilization of Grain in Mississippi. (1) Learn present system of receiving, handling, storing, distributing, & utilizing grain. Learn: how much grain is being produced on farms & how farmers handle it, present storage and transportation facilities, practices, & charges. Indicate present users & handlers of grain. (2) Estimate the present & potential demands for grain & evaluate adequacy of the marketing system to meet the present & potential demand.
Agr. Econ. RRFA-5 HA-5 (SM-11) Coop. USDA (Also see Part 14, Section a.)

Mo. Economic Problems of Grain Marketing and Grain Storage. To (1) make detailed compilation & analysis of laws of state governing grain storage, & of practices of bonding companies, insurance companies, & other financing agencies contributing to grain storage in Mo., (2) learn volume, kind, location, & use of existing processor, terminal, sub-terminal, & local grain storage facility in Mo. for purpose of analyzing their adequacy in view of present & future grain marketing patterns & in coordination with similar studies in other states; & (3) develop more information to assist operators of country elevators in remodling, relocating, & rebuilding local market facilities consistent with the trends in marketing techniques.
Agr. Econ. 179 (NCM-10) (Also see Part 14, Section a.)

Mo. Economic Analysis of Marketing of Grains with Special Emphasis on Buying and Pricing Practices at Country Elevators. To discover (1) effect of quality & locational differences on level of prices & price differentials of grain in state; (2) relation between the prices paid farmers & terminal market prices & factors affecting relation; (3) existing spatial price patterns based on non-existing price influencing factors; (4) non-price methods of competition used by grain marketing in state. (5) Study impact of factors on marketing efficiency of grain.
Agr. Econ. 299 (NCM-19) Coop. USDA (Also see Part 14, Section a.)

Mont. A Description and Analysis of the Market Mechanism for the Movement of Important Feed Grains. To (1) describe movement of feed grains between farms within Montana, Western region, & between Western Region & rest of the U.S.; (2) describe marketing channels thru which movements of feed grains take place & marketing methods involved; (3) analyze functions of marketing mechanism; (4) determine costs & margins, & determine reasonableness of such costs & margins in light of services rendered; & (5) isolate and study weaknesses & problems in order to make recommendations for improving marketing of feed grains.
Agr. Econ. 932 (WM-20) (Also see Part 14, Section a.)

Mont. Operations and Services of Montana Cooperative Grain Elevators. (1) Study facilities, operational techniques, services & costs at cooperative elevators in state. (2) Analyze relationship between costs & facilities, operational techniques & services. (3) Learn possible ways of increasing operation efficiency of grain elevators.
Agr. Econ., Rural Sociol. 1069 Coop. FCS

Nebr. Pricing and Trading Practices for Grain in Nebraska. (1) Describe methods of price determination for wheat, corn, & other grain produced or sold in state. (2) Study recent changes in marketing methods which have caused changes in system of pricing grain.
Agr. Econ. 525 (NCM-19) (Also see Part 14, Section a.)

N. C. Opportunities for Increasing the Economic Efficiency of Grain Marketing and Utilization in North Carolina. To (1) determine the present system of handling, storing, transporting, and utilization of grain in N.C., including a. to find out how much grain is produced on farms in N.C., and how it is handled by farmers; b. to determine present storage policies, facilities, and charges; c. to determine for grain, present transportation facilities, practices and charges; & d. to indicate the present uses of grain in N.C.; & (2) estimate the present & potential demand and outlets for N.C. grain & to evaluate the adequacy of marketing system to meet the present and potential demand, including a. to estimate the present utilization of grain in N.C. and future demand; b. to evaluate the adequacy of transportation services for grain in N.C.; c. to evaluate the adequacy of storage facilities for grain in N.C.; & d. to investigate the competitive position of grain in the agricultural economy of N.C.; to determine what storage & transportation facilities & organizations are needed, and where they are needed.
Agr. Econ., Agr. Engin. HM-1 (SM-11) Coop. AMS (Also see Part 14, Section a.)

N. Dak.

Pricing and Storing Process in Marketing North Dakota Grains. To (1) determine characteristics of pricing process for various types & grades of North Dakota grains; (2) trace effect of various storage facilities & costs upon grain marketing practices in North Dakota; & (3) study effect of various marketing practices upon producer prices & income.
Agr. Econ. 3-2 (NCM-10) Coop. FCA (Also see Part 14, Section a.)

N. Dak.

Price-Quality Relationships for North Dakota Grain. (1) Learn & describe price patterns, selling practices & their effect on grain production & movement. (2) Study price-quality relationships, & market preference & demand for high quality versus low quality grains.
Agr. Econ. 3-10M (NCM-19) Coop. USDA (Also see Part 14, Section a.)

Ohio

Pricing and Trading Practices for Grain in Ohio. To determine (1) & describe present day spatial price patterns & trading practices for grain in Ohio; (2) what shifts have occurred in these patterns & practices over the past decade & their effects on grain movements in state; (3) & analyze causes of these shifts relating where possible price pattern changes with trading practice changes. (4) Assess trends discovered as an aid to forecasting direction of grain price pattern & grain movement changes in the state over the next decade.
Agr. Econ., Rural Sociol. 160 (NCM-19) Coop. ARS (Also see Part 14, Section a.)

Ohio

Marketing Costs and Pricing Methods of Grains in Ohio. To improve the methods of pricing so they will more nearly reflect actual costs of performing the function. (1) Determining cost & problems involved in purchasing grains by various methods at local elevator, (2) developing methods of price discounting & charges that will reflect handling & conditioning costs & value of grains at the local elevator, & (3) learning returns & benefits to either farmer or elevator by pricing or purchasing corn on a shelled weight basis.
Agr. Econ., Agron. ES 360

Oreg.

Economic Analysis of the Relative Profitableness of Crop Rotations Based on Experimental Data from the Pendleton Branch Experiment Station. (1) Analyze yield differentials for individual crops in various crop rotations. (2) Determine factors influencing yields. (3) Estimate net cash revenue from individual crops & major crop rotations.
Agr. Econ. 303-1 Coop. ARS

S. Dak. Grain Marketing Practices and Problems in South Dakota. To (1) determine & analyze major economic problems in marketing South Dakota grain products for purpose of determining improved marketing techniques; (2) investigate existing grain marketing framework, including ascertaining relevant physical characteristics of grain marketing in the state, & determining the underlying physical & economic forces contributing to prevailing grain marketing practices.

Agr. Econ. 224 (NCM-10) (Also see Part 14, Section a.)

S. Dak. The Evaluation of Pricing and Trading Practices in Local Grain Markets in South Dakota. (1) Learn nature of shifts in locational price patterns within state & between state & nearby states. (2) Isolate factors related to establishment of locational price patterns. (3) Learn persistence of existing locational price patterns where these factors no longer operate. (4) Collect data on pricing & trading practices & other non-price methods of competion used by buyers. (5) Estimate value to farmers & grain sellers & cost & value to grain buyers of these pricing & trading practices & other non-price methods of competition. (6) Study impact of factors on efficiency of marketing in state.

Agr. Econ. 299 (NCM-19) (Also see Part 14, Section a.)

Tex. Marketing of Small Grains in Texas. To (1) describe present system of receiving, selling, handling, storing, distributing and using small grains in Texas including determinations of: a. geographic distribution of grain production and methods used by producers in handling each grain; b. advisability of a system of grades and standards for buying small grains; c. present storage practices, facilities and charges; d. present transportation facilities, practices and charges; and e. present users and handlers of grain; and (2) determine present and potential demands for grain in Texas and evaluate adequacy of marketing system to meet present and potential demand

Agr. Econ., Agr. Engin. 932 (SM-11) Coop. AMS (Also see Part 14, Section a.)

Tex. Marketing Efficiencies, Costs and Quality Improvement of Grains in the Gulf Coast Area as Affected by Farm Drying and Storage. To (1) make marketing study of economies involved in farm drying & storage of rice & grain sorghums in comparison with grain disposal immediately after harvest; & (2) determine effectiveness of recently installed mechanical drying & aeration equipment for improving quality of grain immediately after harvest & for maintaining quality during storage.

Agr. Econ., Agr. Engin., Rural Sociol. 940 Coop. AMS

Wis. Pricing and Trade Practices for Grain and Grain Products in Wisconsin. (1) Determine price making forces for grain. (2) Note principal channels thru which grain flows to points of utilization or consumption. (3) Observe major trade practices & their influence on movement of grain from points of origin.
Agr. Econ. 984 (NCM-19) (Also see Part 14, Section a.)

F. Seed

Ala. Relationship of the Microflora to Deterioration of Stored Seed. To learn (1) effects of seed moisture content, storage temperature, & aeration on growth of various species comprising microflora of stored seed, (2) relationship between activity of microflora & deteriorative changes in stored seed, (3) effect of microfloral inhibitors on microbial growth & bioprocesses of seed.
Bot., Pl. Path. 571

Ariz. Seed Increase and Preliminary Evaluation of Plant Introductions that May be Suited to the Southwest. Provide for initial increase of seed of plants adapted to region, conduct preliminary evaluations of adaptability of new plants appearing suited to climatic conditions.
Agron., Hort., Pl. Path. 368 (W-6) (Also see Part 12.)

Ill. Investigation of Basic Physiological and Biochemical Factors Underlying Seed Storage, Handling, and Viability Testing. Learn changes in respiratory enzyme complex as seeds mature, pass into dormancy, & germinate so improved methods of seed storage & viability testing can be developed.
Agron. 15-396 (NCM-23) Coop. ARS

Iowa Seed Treatments for the Control of Seed-Borne and Soil-Inhabiting Pathogens. To determine (1) limitation of organic chemicals for certain disease fungi, (2) value of different chemicals in relation to application methods, dosage, duration of storage, etc., (3) relative effect of soil temperature, moisture, and types on effectiveness of seed treatments, (4) need for seed treatments on different varieties and lines of agronomic crops, and (5) effect of seed treatment chemicals on enzyme systems affecting growth and sporulation of fungi.
Bot., Pl. Path. 858

Ky. Seed Marketing in Kentucky. To discover what market outlets are used by Kentucky seed producers, what processing facilities are available and how such facilities are used.
Agr. Econ. 703, ES 255

Miss. The Response of Southern Seeds and Grains to Conditions of Storage. To determine (1) optimum conditions for storage of several seeds & grains with reference to: humidity & moisture content, temperature, combination of these, & (2) effect of age on vigor of seedlings.
Agr. Econ., Agron. ES 395

Miss. Incidence and Severity of Mechanical Scarification and Injury to Seeds During Processing, Grading and Handling Operations. To (1) learn frequency & extent of scarification &/or mechanical damage to seed as they are subjected to various processing activities, (2) evaluate influence of these actions on germination & vigor of seedlings, on the hard seed content of certain legumes, & on productivity of the resulting plants, & (3) learn means by which scarification or injury to seeds during the processing operation may be reached.
Agr. Econ., Agron., Agr. Engin. ES 396

Miss. Marketing Tung Nuts and Oil Seed Crops. To (1) describe existing marketing facilities, services and practices for tung nuts, soybeans, and cottonseed; (2) determine effect of changing supplies of these commodities on marketing facilities, services and practices; (3) determine pattern of use and estimate demand for these commodities; (4) determine effect of changing relative prices, including price support programs, for these commodities on supply, storage and use; and (5) project probable needs for marketing facilities, services, and practices.
Agr. Econ. HA-11

Miss. A Study of the Development of Equipment and Methods for the Blending of Agricultural Seeds. (1) Observe, analyze, & evaluate blending equipment & procedures. (2) Develop superior methods & equipment.
Agron., Agr. Econ., Agr. Engin. HSP-1 Coop. AMS

Miss. Development of New or Improved Techniques or Methods for the Testing of Agricultural Seed. (1) Evaluate lack of uniformity in germination tests conducted by different seed testing labs. (2) Develop or improve testing procedures for specific crop seeds.
Agron. HSP-2

Miss. Development, Improvement, and Standardization of Techniques and Methods for Evaluating Seedling Vigor. (1) Develop, improve, & standardize techniques for evaluating seedling vigor. (2) Correlate evaluations obtained thru use of techniques developed under Objective I with true stand-producing potential of seed, under favorable & unfavorable conditions.
Agron. HSP-3

Miss. Development and Standardization of Methods and Techniques for Determining Varietal Purity on a Seed or Seedling Basis for Specific Crops. (1) Develop & perfect methods for learning varietal purity on a seed or seedling basis for specific crops. (2) Correlate lab. techniques & methods developed with mature plant identifications. (3) Prepare & publish illustrated artificial keys to varieties of crops studied.
Agron. RRFSP-1 (SM-21) Coop. AMS

Nebr. Production, Analysis, and Use of High Quality Seed. To learn (1) effect of moisture content of seed on germination of grain sorghums & methods of reducing moisture as: best time of applying desiccant, moisture content at which sorghum seed can be successfully dried, effect of dessicant on sorghum germination, effect of pre-drying on sorghum germination; (2) by use of continued planter-drill box sampling on kind & quality of seed planted by farmers & organize information since 1951 in publication form. (3) Effect of coumarin in sweetclover seed on germination of alfalfa, wheat, & oats in germinator.
Agron. 518

Nebr. Development of Basic Information for Improved Methods of Storing, Processing and Labeling Sorghum Seed. (1) Learn relation of seed germinating vigor in lab. tests to field emergence under different temperature conditions; establish varietal differences in ability to produce field stands under different conditions. (2) Evaluate for seed processing & labeling purposes the effect of different fungicidal & other treatments on ability of seed of different lab. germination levels to produce field stands under different soil conditions. (3) Evaluate effect of different storage conditions on germinating vigor & ability to produce stands.
Agron. 568 (NCM-23) Coop. USDA

Nebr. *The Processing, Packaging and Marketing of Certified Seed in Nebraska*. (1) Describe current practices of processing & packaging of certified seed in state; recommend new procedures. (2) Analyze efficiency of processing from cost standpoint. (3) Describe present marketing system for certified seed of various crops, including channels of distribution & importance of various types of dealers. (4) Analyze factors determining price of certified seed, buying & selling methods, & inter-regional competition.
Agron., Agr. Econ. ES 462

Oreg. *The Detection and Identification of Plant Pathogens Associated with Forage Legume Seed*. (1) Detect, identify, & learn pathogenicity of organisms associated with forage legume seed. (2) Develop methods for detection of plant pathogens associated with forage legume seed applicable to improved seed testing procedures.
Bot., Pl. Path., Farm Crops 178 (WM-35)

P. R. *Factors Affecting Seed Germination Under Tropical Conditions*. (1) Learn how germination capacity of seeds produced in Puerto Rico is influenced by changes in environmental factors during production & conservation. (2) Develop better techniques of seed production & conservation to secure maximum percentages of germination of seeds used for crop production.
Pl. Physiol., Agron. 25

S. Dak. *Seed Treatment and Soil Amendments for the Control of Seed Rot and Seedling Blight*. (1) Learn effectiveness of incorporating soil fumigants into the soil for control of soil-borne diseases. (2) Study seed treatment chemicals for control of seed rot & seedling blight of field crops. (3) Search for compounds of low phytotoxicity but with long residual effects against diseases in soil.
Pl. Path. 296

Tex. *Studies of Hybrid Sorghum Seed Production*. To devise a practical method or methods of producing hybrid seed of sorghum in commercial quantities.
Agron. 610 Coop. ARS

II. BARLEY

Colo. Genetic Studies and Linkage Relationships in Barley. To (1) establish the behavior of genes, their interrelationships, their inheritance, & map linkage groups as they occur on the chromosome; (2) keep viable the collection of genetic stocks used in linkage studies; & (3) use the findings in breeding valuable barley varieties.
Agron. 8 Coop. ARS

Ill. Developmental Morphology of Loose-Smut-Infected Wheat and Barley. Study (1) complete life cycle of loose smut fungi with emphasis on initial infection; (2) growth of barley smut mycelium within the plant in relation to developmental morphology of the host. (3) Continue the research for a dependable means of identifying smut-infected plants in the seedling stage & thus shorten the time required for race identification.
Pl. Path. 68-363

Ind. Breeding of Barley for Indiana and Investigations of Related Genetic, Pathological, and Agronomic Characters. (1) Develop & evaluate new varieties of winter barley superior in yielding capacity, winter-hardiness, standing ability, & quality & resistant to diseases, & hessian fly. (2) Study nature of inheritance of morphological & physiological characters & resistance to diseases. (3) Conduct pathological studies needed to evaluate disease hazards & efficient breeding of disease-resistant varieties. (4) Evaluate certain physiological & morphological characters as related to breeding program & agricultural practices.
Agron., Bot., Pl. Path. 968 Coop. ARS

Minn. Varietal Improvement in Barley. To obtain improved varieties of barley for Minnesota
Pl. Genet., Agron. 1304

Minn. Genetics of Barley. To determine the mode of inheritance of characters in barley, & to determine the linkage relations of these characters.
Pl. Genet., Agron. 1312

Miss. Barley Breeding. To (1) develop new varieties of barley better in all respects than currently available strains, (2) determine where in this state barley can best be grown; and (3) conduct fundamental studies when they are needed.
Agron. HC-4

Mo.

Annual Testing and Breeding of Winter Barley Varieties and Strains for Yield, Winter Hardiness, and Disease Resistance, With Special Emphasis on the Smut Diseases (1954). To (1) breed better varieties adapted to Missouri conditions & to test such for hardiness, (2) discover varieties & selections resistant to disease & insects & superior in agronomic qualities & to evaluate such for use as feed, & (3) analyze the genetics governing the inheritance of characters associated with productivity, winter hardiness, disease & insect resistance.
Field Crops 90 Coop. ARS

Mont.

The Improvement of Barley in Montana Through the Development of Superior Varieties and Cultural Practices. To (1) determine adaptation of new & introduced barley varieties & selections, (2) develop, by hybridization & selection, varieties superior to those now grown in Montana, (3) develop & improve cultural methods, (4) develop new uses & expand former uses for barley thru plant breeding, (5) search for basic information for most feasible & economical means of accomplishing these objectives.
Agron. 152, 953 Coop. ARS

N. J.

The Breeding of Varieties of Winter Barley Resistant to Loose Smut. To attempt to develop winter barley varieties that are resistant to the races of smut present in the region.
Field Crops 261 (NE-23) Coop. ARS

N. C.

The Development of Winter Barley Varieties with High Yields of Good Quality Grain and with Resistance to Disease, to Winter Injury and to Lodging.--Breeding--To develop thru breeding varieties or strains of barley combining as many as possible of these characteristics: 1. resistance to powdery mildew, leaf rust, smut, mosaic, stripe, spot blotch & scald; 2. varieties with stiff straw & with sufficient winterhardiness to be grown throughout the state; & 3. good yields of grain with heavy test weight & high feed value. Testing--To evaluate promising new strains from above breeding program or which may be available from cooperators. Germ Plasm Survey--To make survey of germ plasm to find types which may contribute to above breeding program. Genetic Studies--To conduct investigations in genetic variability of barley & develop techniques for more effective selection in the improvement of the crop.
Agron. 57 Coop. ARS

N. Dak.

Biology, Ecology, and Control of the Barley Thrips, Limothrips Denticornis Haliday. Learn (1) distribution, host plants, & life history of barley thrips in N. D.; (2) ecological factors causing sporadic appearance of this pest in barley fields; (3) effectiveness of insecticides less hazardous than parathion; (4) practicability of cultural & other methods of control.
Ent. 5-3

N. Dak.

Breeding and Genetics of Spring Barley.--A. Breeding Spring Barley for Disease Resistance, Desirable Agronomic Characters, Malting and Feeding Quality. To produce varieties which are: (1) resistant to spot blotch, stem rust, & loose smut; (2) satisfactory in malting & feeding quality, & (3) suitable agronomically in yield, straw stiffness & head strength & ease of handling.
Agron., Pl. Path., Cereal Technol. 6-8 Coop. ARS

N. Dak.

Resistance to Barley Leaf Diseases. (1) Locate barley species, or species closely related to barley, which are resistant to one or more barley leaf diseases. (2) Cross these species with varieties of common barley.
Agron. 6-16 Coop ARS

N. Dak.

Testing and Improvement of North Dakota Barley Varieties for Industrial Acceptance. To evaluate the malting quality of new barley hybrids with the object of improving the acceptability of North Dakota barley to the malting & feed industry
Cereal Technol., Agron. 10-5 Coop. ARS

Okla.

Barley Diseases and Their Control. To (1) develop test for spot blotch resistance in barley, & test varieties from world collection for sources of resistance; (2) determine race or races of powdery mildew in Oklahoma & test for resistance to these races; (3) grow regional mildew nursery in cooperation with USDA; (4) closely observe breeding material at Stillwater & commercial plantings for appearance of new disease or outbreaks of diseases whose causal agents are known; & (5) establish root disease garden where resistance to root diseases can be evaluated.
Bot., Pl. Path., Agron. 599 Coop. ARS

Pa.

Scald Resistance in Winter Barley. (1) Search for sources of scald resistance in barley so that parental material may be available for breeding scald resistant winter barley. (2) learn if scald problem is due to 1 or more pathogenic races of Rhynchosporium secalis, (3) investigate methods of inoculation to find best method for large scale outdoor testing, (4) learn if organism is seed borne.
Bot., Pl. Path. 1250

Tenn. Barley Breeding. (1) To obtain a smooth-awned winter barley adapted to Tennessee conditions, (2) to increase tillering in Tennessee Beardless & obtain a strain which shatters less readily than that now grown, & (3) to make genetic studies of tillering & shattering.
Bot. 81 Coop. ARS

Tex. Barley Improvement. To (1) develop or discover new varieties of barley superior to present varieties, & adapted to production of grain, forage, or a combination of the two, (2) incorporate into adapted varieties resistance to greenbugs from Omugi & other oriental varieties, & to continue search for resistance to greenbugs, (3) attempt to incorporate resistance to diseases attacking barley, such as mildew, smuts, leaf blotches, & false stripe, (4) develop varieties resistant to leaf & stem rust for central & southern parts of state, (5) learn cold resistance or tolerance of varieties & new strains, (6) give attention to forage characteristics of barley varieties & new strains, (7) cooperate in trials of yield, tests of disease resistance, insect resistance, hardiness, & development of multiple factor genetic stocks of value in the breeding program, (8) investigate additional commercial uses for barley, (9) conduct research to increase understanding of practical problems of the crop.
Agron., Pl. Physiol. & Path. 1029 Coop. ARS

Wash. Breeding and Genetic Studies in Barley. To (1) develop improved varieties of barley for Washington & the Pacific Northwest; (2) use genetic knowledge of agronomic characters in development of better barleys; & (3) study genetics of agronomic characters where information is not available but is needed for efficient attainments under Objective 1.
Agron. 1006

Wash. Processing and Treatment of Barley to Improve its Nutritional Value for Poultry. To study (1) effect of removing fibrous hull from barley grain on its nutritional value for poultry, (2) effects of different processing treatments as steaming, toasting, & autoclaving on nutritional value, (3) investigate different methods as pearling & grinding followed by sifting to remove fibrous hull, (4) relative acceptability of differently processed barley as compared to wheat or corn.
Poultry, Anim. Indus., Agron. 1291

W. Va. Breeding Winter Barley for High Yields and Powdery Mildew Resistance. Develop high yielding varieties of winter hardy barley resistant to powdery mildew. Study reaction of available strains to prevalent strains of mildew in field & greenhouse.
Agron., Genet. 86 (NE-23)

Wis. *The Varieties of Barley and Cultural Practices Dealing with the Production of Barley, and Breeding for Malting Quality: Research on Evaluation of Malting Quality of Barley.* To breed new barley varieties for economical grain production & good industrial quality.
Pl. Path., Agron. 530 Coop. ARS

Wis. *Reaction of Accessions of Barley (Hordeum Spp.) in the World Collections of Small Grains to the Yellow Dwarf Virus.* Screen the C.I. collection of barley for resistance to the yellow dwarf virus, & make resistant barley available to breeders.
Agron. 761 (NC-7) (Also see Part 12.)

Wis. *Maintaining Barley Quality During Storage and Shipment.* Obtain information on influence & control of factors associated with rapid deterioration of grain. (1) Conduct drying experiments. (2) Learn physical, chemical, & biological changes in grain. (3) Evaluate barley harvested under moist conditions. (4) Store same samples under aerated & nonaerated conditions & learn chemical & biological changes in quality & correlate with O & CO_2 present & with formation of specific biproducts during storage. (5) For final quality evaluation, make physical & chemical analysis of barley & of malt.
Agron., Pl. Path. 993 Coop. ARS

Wyo. *Breeding and Selection Studies with Barley.* To (1) develop improved varieties of barley, outstanding for yield, with desirable agronomic characters & with disease & insect resistance; (2) determine & recommend outstanding varieties for production in Wyoming; & (3) be responsible for a source of genetically pure breeders seed of recommended, named, & released varieties of barley thru the Station & Wyoming Crop Improvement Association, primarily to the public.
Agron., Agr. Econ. 487

III. CORN

A. Varieties, Breeding and Genetics

Conn. Genetic and Cytological Study of Hereditary Characters in Plants with Special Attention to Genes Controlling Pollen Production in Combination with Sterile Cytoplasm. Further information is needed concerning number, location in the chromosomes, & the time & mode of action of these pollen-restoring genes.
Genet. 501

Conn. Genetic, Cytological, and Biochemical Studies on Cytoplasmic Differences in Plants. To study (1) mechanism responsible for cytoplasmic pollen abortion in maize thru genetic, biochemical, & cytological techniques; (2) extent & nature of gene-cytoplasmic interactions, & their role in differentiation & speciation.
Pl. Path., Ent., Biochem. 507

Fla. Corn Breeding. To (1) breed improved corn hybrids, with emphasis on higher yields, better standability, & more insect & disease resistance; & (2) study comparative efficiency of different breeding methods.
Agron. 374

Ga. Corn Breeding. To develop high yielding white & yellow corn hybrids & varieties well adapted to various soil & climatic conditions of Georgia.
Agron. 34

Ill. Studies on Monoploidy and Polyploidy in Corn. (1) Evaluate monoploid technique as a method of producing inbred lines. (2) Observe & interpret chromosome behavior of monoploids. (3) Evaluate "elongate" method of producing tetraploids. (4) Establish tetraploid synthetic varieties of wide genetic variability. (5) Learn causes of low seed set in autotetraploids.
Agron. 15-367

Ill. Inheritance of Economic Characters in Corn. To study (1) & develop research methods applicable to inheritance of economic characters in corn, (2) inheritance of characters that are direct components of grain yield, (3) inheritance of other characters of corn affecting yield or quality of crops, (4) effects of certain environmental factors on characters under investigation.
Agron. 15-379

Ill. The Assembly, Evaluation, Seed Increase and Distribution of New Introductions and Genetic and Chromosomal Tested Stocks in Maize. To establish a North Central maize genetics research center to assist maize geneticists & breeders of the region, including screening new introductions for genetic value, preserving existing adapted stocks, propagating tester stocks, & exchanging information & genetic materials among workers.
Agron. 15-382 (NC-7) Coop. ARS (Also see Part 12.)

Ind. Mutant Genes and Exotic Germ Plasm in Corn and their Use in the Production of Superior Hybrids. (1) Incorporate sources of genetic diversity present in the varieties of maize from Central & South America into our breeding stocks. Study (2) effects of mutant genes on plant growth with a view to finding those having some advantageous aspects for crop production, (3) biochemical agencies thru which these mutant genes affect plant growth & development.
Bot., Pl. Path. 883

Ind. Development of High Amylose Corn. (1) Develop inbred lines with gene combination rendering them high in amylose & agronomically desirable. (2) Test strains of corn produced by breeding for amylose content. (3) Characterize carbohydrates of high amylose starch strains. (4) Develop hybrid combinations of inbreds produced.
Biochem., Agron., Bot. 889

Ind. Breeding and Testing of Superior Popcorn Hybrids. (1) Develop higher quality, better yielding popcorn hybrids. (2) Produce superior cross-sterile hybrids. (3) Examine usefulness of popcorn germplasm in production of dent & flint corn hybrids.
Bot., Pl. Path. 971 Coop. ARS

Ind. Breeding, Testing, and Distribution of Superior Dent Corn Hybrids. Produce (1) & test new inbreds from open-pollinated varieties, from 2nd cycle inbreds, by recovery from backcrossing, by recurrent selection; (2) dent corn hybrids of superior yield, standing ability, disease & insect resistance, & quality, (3) breed corn for specific uses, (4) incorporate cytoplasmic male-sterility & fertility-restoring factors into inbred lines used in hybrid seed production, (5) maintain, produce, & distribute pure foundation stocks of inbred lines used in approved hybrids, (6) cooperate with corn breeders to obtain superior hybrids.
Bot., Pl. Path. 973 Coop. ARS

Iowa

The Development of Improved Corn Hybrids. To (1) produce superior inbred lines of corn for different sections of Iowa & the Corn Belt; (2) evaluate lines for combining ability, resistance to or tolerance of major corn insects, resistance to important plant pathogens, & nutritional & industrial characteristics; (3) compare breeding procedures as to relative efficiency in obtaining desired characteristics to the maximum; (4) use existing data & new data to find most efficient procedures for conducting trials for yield or other desirable agronomic characters; & (5) conduct needed basic studies to facilitate attainment of above objectives.

Agron., Bot., Pl. Path., Chem., Ent. 1140 Coop. ARS

Iowa

Genetical and Cytological Studies of Maize. (1) Investigate multiple-factor inheritance with reference to combining ability, disease resistance, insect resistance, protein quality, & oil & carbohydrate characteristics. (2) Study inheritance of resistance to corn leaf rust; Puccinia sorghi. (3) Investigate & develop new procedures of value in improving maize breeding techniques. (4) Learn structure & developmental morphology of characters pertinent to genetic studies. (5) Study mutation process using mutable genes & other mechanisms of mutation.

Agron., Genet., Bot. 1335

Ky.

Corn Breeding. To produce better inbred lines of corn & better hybrids for use in Kentucky than now grown.

Agron. 155

La.

Corn Breeding. To conduct a broad and comprehensive corn breeding program with following objectives: (1) Developing new and better inbred lines for use in production of superior hybrids. (2) Testing inbred lines. (3) Determining best methods in obtaining maximum seed production from inbred lines. (4) Increase foundation seed stocks of inbred lines. (5) Testing single-cross hybrids. (6) Testing double-cross hybrids and (7) Determine most efficient methods of obtaining maximum yields of hybrid corn.

Agron. 131 Coop. ARS

Maine

Improvement of Field Corn for Maine. (1) Produce or locate new field corn hybrids adaptable to short season growing conditions of state. (2) Test feasibility of commercial seed production of adapted hybrids.

Hort. 65

Md. *Breeding for Better Dent Corn*. To (1) continue effort to correct deficiencies in hybrid corn by replacement with new hybrids, or by modifying hybrids now in use, (2) concentrate more favorable genes in the germ plasm of useful inbreds by intercrossing, backcrossing, & selection, (3) evaluate inbreds & their hybrid progenies with regard to general productivity, disease resistance, stalk strength, retention of ears after maturity, tolerance to drought, response to rate of planting, & other characters of agronomic importance.
Agron. B-50 Coop. ARS

Md. *Spontaneous and Induced Multiple Seedlings and Haploids of Zea Mays, Capsicum Frutescens and Other Economic Plants and their Use in Plant Breeding*. To (1) determine the frequencies and types in regard to number of members and chromosome numbers of spontaneous multiple seedlings and compare with the frequencies and types of multiple seedlings induced by X-rays or other agents; (2) determine the origin of spontaneous and induced multiple seedlings and compare differences or similarities in the modes of development of spontaneous and induced polyembryony; (3) establish degree of genetic control of spontaneous polyembryony; (4) ascertain the frequency of haploids among induced multiple seedlings and compare with the frequency of haploids among naturally occurring multiple seedlings; (5) utilize haploids in the development of superior new varieties; (6) evaluate resulting homozygous lines in field performance.
Bot. F-15b

Md. *Sweet Corn Breeding with Particular Reference to the Utilization of Cytoplasmic Male Sterility in the Production of F_1 Hybrid Seed Corn*. Learn chromosomal locations of pollen restoration genes. (2) Use information to develop pollen restoration sweet corn inbreds, capable of restoring complete fertility in crosses with cytoplasmic male sterile inbreds. (3) Evaluate available sweet corn hybrids & inbreds for use under northeastern conditions. (4) Produce new hybrid combinations, & desirable combinations available, by cytoplasmic male sterile method.
Hort. Q-81-c (NE-32) (Also see Part 22, Section a.)

Mass. *The Evaluation and Use of Flint Lines in Flint-Dent Hybrids*. To develop and improve early maturing hybrid field corn with wide adaptation to the higher plateau regions of the State.
Agron. 3 Coop. ARS

Mich. Corn Breeding, Improvement, and Genetics. To (1) develop improved corn hybrids for Michigan; (2) conduct fundamental research in corn genetics, breeding methods & physiology; (3) evaluate corn cultural practices, particularly as affecting new corn hybrids; (4) develop improved methods of hybrid seed corn production; & (5) evaluate commercial hybrids for their adaptation to Michigan soil & climate.
Farm Crops, Chem., Soils, Bot. 115 Coop. ARS

Minn. Corn Improvement. To study (1) production of improved hybrids for the various maturity zones in the State; (2) relative value of various methods of breeding; & (3) methods of field plat technic & improved practices.
Pl. Genet., Agron. 1311

Miss. Corn Improvement Through the Use of Inbred Lines. To develop (1) better methods for developing inbred lines that are high in yield as inbreds, high in yield as crosses, resistant to insects, resistant to diseases, and excellent in agronomic characters: (2) single cross hybrids which are excellent seed parents and do not need to be detasseled, and single cross hybrids for use as male parents which restore fertility to sterile female single cross; and (3) double cross hybrids which produce high yields of excellent quality corn, adapted to mechanical farming
Agron. HC-1

Mo. Genetic Studies with Crop Plants. To study (1) the fundamental mechanism of heredity; and (2) aspects of genetics which promise to be of greatest significance in the improvement of crop plants.
Field Crops 48 Coop. ARS

Mo. Breeding Hybrid Corn for Missouri. To (1) develop agronomically superior hybrids, (2) develop hybrids for special purposes, (3) conduct investigations in pathological, entomological, & cultural problems, & in breeding techniques.
Field Crops 85 Coop. ARS

Nebr. Determination and Application of the Principles of Corn Improvement. To (1) determine relative merits of various methods of improving inbred lines; (2) study possibilities of increasing efficiency of development of new lines; (3) study genetic principles involved in corn improvement; (4) study comparative merits of more variable corn populations than commonly used double-cross hybrids, particularly in central & western Nebraska; & (5) apply these principles to develop improved strains of corn for Nebraska farmers.
Agron. 11A

Nebr.

Genetics of Agronomic Plants and Soil Microorganisms. To (1) develop principles, techniques & other information helpful in plant breeding & other agronomic work; (2) assist plant breeders in working out fundamental genetic problems arising in regular experimental work; (3) develop genetic information on soil microorganisms; & (4) develop information in fundamental genetics.

Agron. 411

Nebr.

Evaluation of Effects of Radiations on Quantitative Characters in Corn as Related to Breeding Improved Varieties and Hybrids. (1) Evaluate & characterize genetic variability induced in quantitative characters yield & in some cases plant height, date of flowering, ear length & height, ear diameter, & number of ears. (2) Predict genetic gain to be expected from selection within a population derived by an irradiation treatment as compared to selection within a control population handled in same way except in irradiation. (3) Compare actual gain realized with predicted gain to check reliability of prediction formulas when applied to irradiated populations. (4) Compare induced mutation rates with natural mutation rates as indicated by genetic variability obtained in inbred lines subjected to irradiation & in control lines treated the same except for irradiation treatment. (5) Learn if use of radiations offers promise in breaking tight linkages between genes.

Agron. 554 Coop. AEC

N. J.

Field Corn Breeding. (1) Develop best hybrids for state needs by: inbreeding & selection of new inbred lines suited to all ranges of maturity; creating new hybrids & screening out adapted ones; developing a program of breeding for stalk rot resistance; develop hybrids that can be produced with maximum efficiency; using wisely cytoplasmic pollen sterility & pollen restorers; developing drought resistance. (2) Study factors operative in seed set under other than natural conditions as: nutrient level, nutrient balance, cutting back of silks, methods of collecting pollen, & soil moisture level.

Farm Crops 227

N.Y.
(Cornell)

Breeding and Testing Crop Plants.—B. Breeding Corn for Grain and Silage. Develop improved varieties of field corn by: development, selection, maintenance & introduction of inbred lines; use of cytoplasmic male sterility & fertility restoration factors in hybrid seed production; hybrid production & evaluation; studying special problems associated with the more general aspects of corn breeding

Pl. Brdg. 116-B Coop. ARS

N.Y.
(Cornell)

Studies of Heredity in Plants.--A, Genetic Studies of Maize. To learn the mode of inheritance of numerous characters of the plants studied.
Pl. Brdg. 117-A

N.Y.
(Cornell)

An Investigation of Methods of Sampling and Estimating the Characteristics of Human and Biological Populations. 2: Statistical Methods of Quantitative Genetics. Construct more realistic quantitative genetic models & more efficient procedures for estimating the models.
Pl. Brdg. 152-2

N. C.

Quantitative Inheritance in Corn. To determine (1) characterization of genetic variation that will enable prediction of effectiveness of alternative breeding procedures, (2) comparison of observed & predicted results of breeding programs.
Genet., Agron. 48

N. C.

Breeding Investigations for the Improvement of Corn Strains Adapted to North Carolina. To (1) develop strains of corn which are adapted to each area in North Carolina; (2) develop methods of maintaining superior strains & aid in multiplication of such strains; (3) study breeding methods & genetic mechanisms related to corn; & (4) study inheritance of resistant factors in the host to important insects & diseases of corn under local conditions.
Agron. 58 Coop. ARS

N. Dak.

Breeding and Development of Corn for the Short Growing Season Areas Prevalent in North Dakota. To (1) isolate new inbred lines of corn which are adapted to the environmental conditions of the short & cool growing seasons of this area & which possess desirable agronomic characters & resistance to diseases & insects; (2) improve the plant & seed characters & resistance to diseases & insects of inbred lines now used; (3) introduce & study the adaptability of inbred lines originated in other Northern State Experiment Stations for use in North Dakota; (4) intercross & study combining ability & adaptability of selected inbred lines; (5) test reaction of North Dakota inbred lines with the cytoplasmic male sterile character.
Agron., Pl. Path. 6-6

N. Dak. Low Temperature Endurance in Corn. To (1) test & evaluate ability of corn inbred lines to germinate & develop in seedling stage at sub-optimum temperature; (2) study association between a. ability to germinate & grow at sub-optimum temperature & ability to resist slight freezing in early seedling stages; & b. ability to germinate & grow at sub-optimum temperature & some morphological, physiological or pathological character of corn plant or kernel; (3) study effect of environment under which seed is produced upon reaction of progeny grown at low temperature; & (4) study rapidity of germination & ability to produce good stands under adverse, cold, wet soil conditions.
Agron., Pl. Path., Bot. 6-7

Ohio Breeding Field Corn for Ohio. To develop strains of corn superior to those now available in the different parts of Ohio
Agron. 20 Coop. ARS

Ohio Mineral Nutrition of Corn.--2. Inbreeding Corn for High Mineral Accumulations. To produce inbreds that have in addition to their other desirable qualities high mineral accumulating abilities.
Agron. 88-2 Coop. ARS

Pa. Corn Breeding. To develop corn hybrids better adapted to Pa. conditions. 1. Development of inbreds. 2. Evaluation of inbreds. 3. Developing & testing double crosses.
Agron. 911-A

Pa. Fundamental Genetics of Corn. To (1) detect monoploid plants & produce homozygous diploids for studies of agronomic & disease characters; (2) investigate pattern of inheritance of mineral deficiency in corn strains, particularly Mg deficiency; (3) incorporate glumeless ear character as a quality factor in field & sweet corn; (4) search for new genes, determine linkage relations of these & other unplaced genes, & develop new combinations as linkage testers; & (5) conduct studies which would implement the above.
Bot. 1192

P. R. The Improvement of Native Field Corn by Selection and Through Hybridization of Desirable Inbred Lines. Improve yielding capacity of native corn by selection & hybridization.
Pl. Brdg. 36

P. R. The Transfer of Cytoplasmic Male-Sterility and Fertility-Restoring Factors to Inbred Lines of Corn. Transfer cytoplasmic male-sterility & fertility-restoring factors to corn inbred lines to be used in commercial production of hybrid seed.
Pl. Brdg. 112

S. Dak.

The Breeding of Superior Field Corn Hybrids. (1) Develop corn hybrids better adapted for environmental conditions of state; improve yield levels, & lodging resistance as it pertains to root & stalk weakness; work for better drought resistant hybrids; incorporate disease resistance, especially against root rot organisms; breed for insect resistance as corn borer; incorporate male sterile in hybrids available to public. (2) Develop new inbreds which, when used with each other or existing inbreds from various stations, will accomplish objectives in No. 1. (3) Study aspects of plant breeding for improving hybrids as: methods of selection & mating systems, aspects of heterosis, work on methods for developing drought-resistant inbreds, & methods for development of inbred lines thru use of chemicals & radiation.

Agron., Pl. Path. 66

Tenn.

Corn Improvement. (1) Develop superior inbred lines, resistant to disease, insect pests, & of high quality. (2) Produce superior single & double cross hybrid combinations from these & other inbred lines. (3) Learn influence of cultural practices on yield & quality of corn, with reference to production & maintenance of quality seed stocks. (4) Study methodology of breeding, including research in genetics & physiology. (5) In cooperation with other departments & agencies, study diseases & insects of corn & control methods. (6) Investigate crop qualities with reference to yield & value.

Agron. 34 Coop. ARS

Tex.

Inheritance and Improvement in Corn. To (1) develop improved corn hybrids for various corn-growing regions of Texas; (2) obtain information on relative merit of different corn breeding methods; & (3) study inheritance of various characters in corn, with special reference to those of economic importance.

Agron. 227

Va.

Development and Utilization of Adapted Corn Inbred Lines and Hybrids with High-Protein and High-Oil Grain. To (1) isolate inbred lines which have high oil and high protein in the grain and which are adapted for use in Va.; (2) utilize these inbred lines in combinations with themselves or other inbred lines in the production of adapted, high yielding hybrids higher in oil and protein than those now in use; (3) study inheritance of oil and protein in corn grain during inbreeding and subsequent crossing; (4) study chemical and genetic reasons for the inherent high-protein content of high-oil selection; (5) study chemical nature of the protein in the most promising selections by amino acid determinations; (6) study chemical nature of the oil in the most promising selections by analysis of the lipid fraction; (7) study niacin content of the most promising selections; and (8) study nutritive value of the most promising selections by rat feeding experiments.

Agron., Biochem. 86035

Va. Development and Selection of Adapted Corn Inbreds and Hybrids. To (1) develop & maintain a source of superior germ plasm adapted to Va. conditions; (2) develop by combining inbreds developed by the Va. Agricultural Experiment Station & other experiment station hybrids which are adapted to growing conditions in Va.; (3) thoroughly test experimental corn hybrids with respect to adaptation to Va. conditions; (4) cooperate with other experiment stations; (5) to study & establish relationships that may exist between physical & genetic characteristics of inbred lines & their crosses.

Agron., Pl. Path. 86041

W. Va. Corn Genetics and Breeding.--1, Corn Genetics. To study (1) mode of attack, (2) chromosomal translocations with reference to linkage in chromosome 5, and (3) crossing-over in chromosome 1, in a special translocation stock. II, Corn Breeding. To study (1) production of superior hybrids of dent corn; (2) production of yellow-seeded varieties of Woodburn White Dent, and (3) production of strains of sweet corn adapted particularly to the Point Pleasant area with high quality, uniformity, earliness, and resistance to disease and ear-worm damage characteristics.

Genet. 29

Wis. The Development of Superior Strains of Hybrid Field Corn. (1) To breed disease resistant, high yielding varieties of field corn adapted to soils & climate of Wisconsin.

Agron. 309 Coop. ARS

Wis. The Origin of New Gene Forms in Corn. To (1) characterize kinds of mutations occurring naturally at the P locus in somatic tissues, (2) compare spontaneous & artificially induced mutations, (3) measure frequency of mutations of different P alleles, & (4) study factors conditioning mutation process.

Genet. 777

B. Culture and Physiology

Ark. Corn Fertilizer and Spacing Experiments. To (1) determine effects of 5 N levels and 3 spacings on yields of hybrid corns; and (2) study effect of above factors on ear size, number of ears per stalk, and on root and stalk lodging of two hybrids—a late-maturing prolific and an early, non-prolific hybrid.

Agron. 363

Del. Green Manuring Practices and their Effect on Corn Yields. To learn (1) effectiveness of different green manuring methods for increasing corn yields, (2) rate of breakdown of various plant residues & nature of soil organic matter produced.

Agron. 35A

Fla. The Biosynthesis of Lysin and Tryptophan. Learn mode of synthesis of the amino acids, lysine & tryptophan in higher plants.

Bot. 810

Ga. Influence of Certain Plant Nutrients on Yield and Quality of Corn. To determine the influence of newer forms of phosphates in varying quantities and in combination with lime & other plant nutrients on the yield and quality of corn in the Tennessee Valley watershed area of the mountainous section of north Georgia.

Agron. 35

Ga. An Evaluation of the Practical and Economical Aspects of Sod-Corn Rotations in North Georgia. To learn (1) if an economical & practical rotation superior to continuous corn can be developed in mountain area, (2) value of rotation on soil productivity & fertilizer utilization, (3) uptake of N, P & K in forage as influenced by fertilization & duration of sod, (4) fertilizer treatment needed to maintain or increase soil productivity & to correlate crop yields & N, P & K uptake by forage, with chemical soil tests.

Soils., Fert., Field Crops. 36

Ga. Rates of Nitrogen Fertilization for Corn with Different Levels of Plant Populations with and without Irrigation. To learn effect of ample supply of water on the inter-relationship between N & plant population on corn grown under different environmental conditions & their effects on yield & nutritive value.

Agron. 45

Ga. The Effect of Deep Tillage and Deep Placement of Fertilizer on Subsequent Crop Yields, Moisture Conservation, and Soil Structure. Learn effect of deep tillage & deep placement of fertilizer on plant growth, root growth, soil moisture, bulk density, & power consumption required for primary tillage.
Agr. Engin., Agron. 311 Coop. ARS

Ill. Improvement of Power, Machinery and Labor Efficiency in Farm Operations. (1) Learn effect of tillage on compacted & non-compacted soils as reflected by corn yield, power requirement for plowing, & physical characteristics of soil; relation between soil compaction, corn yield, power need for tillage, & physical characteristics of soil; study means for improving tilth of compacted soils. (2) Learn flow characteristics of various fertilizer solutions under gravity pressure & develop improved, simplified equipment for application of fertilizers. (3) Learn factors affecting penetration of soils by high-pressure liquid jets & apply knowledge in developing equipment for injecting anhydrous ammonia.
Agr. Engin. 10-333

Ill The Relation of Hormones, Ascorbic Acid, Ascorbic Acid Oxidase, and Other Compounds in the Development of Functional Ear Shoots of Corn. To (1) learn cytological & biochemical processes involved in the development of ear shoots of corn; (2) learn effects of pollination of subsequent biochemical & cytological changes of ear shoots of corn; & (3) investigate nature of growth regulating substances involved in ear kernel development in corn.
Agron. 15-370

Ill. The Occurrence and Activity of Glycolytic Enzymes in Corn. To (1) determine if glycolytic enzyme system can be detected in corn seeds & seedlings using methods which have been shown adequate with other plants; (2) determine presence & degree of activity of glycolytic enzyme system in various inbred lines & hybrids of corn; & (3) isolate & characterize specific enzymes such as aldolase & triose phosphate dehydrogenase which play key roles in this metabolic system.
Agron. 15-371

Ill. Soil Moisture as a Factor in the Growth and Yield of Corn. To (1) obtain quantitative information on relation between different levels of soil moisture deficiency & growth & physiologic behavior of corn at different growth stages; (2) determine efficiency of water use by corn at different levels of soil moisture deficiency under fertility conditions & plant populations conducive to high yields; & (3) relate water use by corn to open-pan evaporation & other climatic characteristics.
Agron. 15-373

Ill. Relation of Light, Nutrients, and Carbon Dioxide to the Metabolism of Corn Plant and to its Yield of Stover and Grain. To learn (1) relation of light to composition & to yield of stover & grain per plant of corn at different rates of planting, (2) relation of CO_2 content of air to composition & to yield of stover & grain per plant of corn at different rates of planting, (3) metabolism of corn plant & its response to different light, CO_2, & nutrient conditions.
Agron., Pl. Physiol. 15-377

Ill. Effect of Planting Method, Slope, Crop, and Weather Conditions on Soil and Water Losses and Yields. (1) Learn effect of seasonal variations in weather on soil & water losses from land used in production of corn. Study (2) effect of slope on soil & water losses during production; (3) planting methods & their effect on soil & water losses & yields.
Dixon Springs 40-332

Mo. The Use of Water in the Production of Agricultural Crops. a. Irrigation and Tillage in Corn Production. To determine (1) optimum irrigation procedures to be used in the production of corn with high fertility levels; and (2) type of seedbed preparation that will give greatest return for corn under irrigation.
Agr. Engin. 2

Mo. Soil Fertility and Corn Production. To learn proper use of fertilizer nutrients in connection with other management practices, for most efficient production of corn on various soils of state.
Soils, Fert., Field Crops. 268

Mo. Corn Production in Intensive Rotations with Small Grain. To learn (1) use of corn & compare it with other crops for use in intensive 2-crop, 1-year rotations, (2) methods & ways of improving techniques of quickly preparing seedbeds & planting corn & comparison crops following harvesting of small grain, (3) earliest stages of maturity practical for harvesting of crops which will be followed by other crops in intensive rotations, (4) methods & to improve techniques of early harvesting of corn & comparison crops.
Agr. Engin., Field Crops 272

Nebr. The Relationship Between Meteorological Factors and the Rate of Water Use by Corn. (1) Relate evapotranspiration, meteorological phenomena, & physical characteristics of the soil to crop response. (2) Develop a water use equation for calculating irrigation needs of corn.
Agr. Engin. 570 (NC-46) (Also see Part 18.)

N. J.	Study of Some Factors Affecting Corn Yield. To (1) develop cultural improvements & techniques to further increase productiveness of hybrids, (2) determine which hybrids have the ability to produce top yields under intense management & (3) check effect of planting pattern on stalk rot incidence as well as other factors. Agron. 228
N.Y. (Cornell)	An Investigation of Methods for Improving the Quality and Economy of Production of Feed Crops in the Principal Soil and Climatic Regions of New York State.--II, Corn Investigations. To improve efficiency of corn production by decreasing costs per bushel of grain or ton of silage and by decreasing storage losses. Agron. 46-II
N.Y. (Cornell)	Weed Control in Field Corn and Small Grains. Learn by lab., greenhouse & field studies safe & economic recommendations for control of weeds in field corn & small grains. Agron. 50-1 Coop. ARS
N.Y. (Cornell)	Studies of the Efficiency of Potassium Fertilizers in Relation to Plant Growth and Composition on Various New York Soils.--1. Studies of Potassium Fertilization of Corn with Special Reference to the Effects of the Chloride Ion. Study the effects of sources & rates of potash fertilizers applied in row & broadcast upon yield & plant tissue composition; study effects of chloride ion upon yield, plant tissue composition, & drought resistance. Agron. 176-1
N. Dak.	The Effect of Commercial Fertilizers and Plant Population on Yield & Soil Moisture Utilization by Corn. Learn effect of fertilizer & plant population on development & yield of corn & effect of soil moisture status under growing corn. Soils, Agron. 15-6
Ohio	Mineral Nutrition of Corn.--1. Mineral Element Requirements of Pure Lines of Corn. To classify important pure lines used in hybrid corn program as to their ability to use the major and minor elements, and to study deficiency and toxicity symptoms of these elements in different growth stages. Agron. 88-1 Coop. ARS
Ohio	Mineral Nutrition of Corn.--3. Mineral Nutrition of Corn Hybrids and Pure Lines. To determine most favorable ratio or balance of major ions for optimum growth of corn hybrids and pure lines. Agron. 88-3 Coop. ARS

Ohio

Corn Production. Corn Intercropping. To develop principles & practices of intercropping in corn which are adapted to Ohio corn belt agriculture as a means of (1) introducing green manure crops in corn, (2) making direct meadow seedings in corn, (3) extending practical range of corn-wheat sequence, & (4) developing new corn-grain combinations & sequences.

Agron., Agr. Engin., Ent. 102

Ohio

Efficiency of Fall and Spring Applied Nitrogen for Corn. Learn efficiency of fall & spring applied nitrate nitrogen & ammonia nitrogen as sources of N for corn.

Agron. 169 (NC-16) (Also see Part 21, Section b.)

Pa.

Fertilization and Management Practices for Corn Production. To evaluate (1) effects of fertilizers, fertilization practices, & varying plant populations on the efficiency of production using new recommended hybrids in typical corn-producing sections of Pa.; & (2) soil physical & chemical properties which affect corn production.

Agron. 911-D

Pa.

Physiological and Nutritional Investigations of Corn and Other Crop Plants. To (1) develop tests to characterize fundamental interplant difference to aid in selection of inbreds, varieties or species for specific conditions, & in management of crops for production; & (2) evaluate inbred, varietal & species differences in nutritional & water needs.

Agron. 1238 Coop. ARS

W. Va.

The Interrelation of Soil Fertility, Planting Rate, and Geometry of Spacing in Relation to Yield of Various Hybrid Corn Varieties. To (1) determine optimum population and spacing of various corn varieties at different fertility rates; and (2) correlate effect of rate of planting and plant spacing with observed plant characteristics which include ear size, shelling percentage, stalk barrenness, lodging, and nutrient uptake.

Agron., Genet. 38

W. Va.

Weed Control in Corn. (1) Learn & demonstrate effective methods of weed control in corn under state conditions with emphasis on grass control. (2) Study chemical weed control as related to type of herbicide, rate & time of application on corn. (3) Study factors influencing germination & viability of weed seeds so that plots under weed control may be seeded with weeds with assurance of a stand. (4) Learn economic losses caused by weeds & cost of weed control in corn.

Agron., Genet. 52

C. Harvest, Storage and Processing

Ill. Improvement of Efficiency and Safety of Corn Harvesting Machinery. To (1) find improved methods of harvesting corn; (2) establish design principles for corn harvesting equipment which will reduce losses & accident hazards.
Agr. Engin. 10-332

Ill. Silage Crops for Dairy Cattle. To compare southern varieties of corn with those in this section & prolific with non-prolific types of corn for silage, seeking a type which will combine large yields of dry matter per acre with good keeping qualities & feeding value as silage.
Dairy Sci. 35-309

Ill. Drying and Curing Problems of Seed Sweet Corn and Popcorn. To determine factors causing injury to sweet corn seed during artificial drying & to work out methods of artificially curing popcorn for market.
Hort. 65-340

Nebr. Transportation and Storage of Nebraska Grain. To (1) analyze methods of grain transportation & storage to find ways to make these facilities more effectively serve needs of farmers, middlemen, & consumers as well as improve efficiency of present & potential storage & transportation facilities; (2) describe present capacity, type, & location of grain storage & transportation & measure efficiency of existing & alternative facilities; (3) analyze effects of quality changes which occur under different methods & periods of storage & transportation; (4) measure & analyze storage & transportation costs, & factors influencing them under various alternative conditions; & (5) evaluate public grain warehouse legislation & administration in Nebraska.
Agr. Econ. 421 (NCM-10) Coop. USDA (Also see Part 14, Section a.)

Pa. The Feeding of Silages to Brood Sows. Study effect of feeding various kinds of silages to brood sows.
Anim. Husb., Agr. & Biochem. 882-C

S. C. Control of the Rice Weevil and Associated Insects in Farm-Stored Corn and in Food Products made from Such Grain. To (1) find an economical, practical method of controlling rice weevil & associated insects in farm-stored corn; (2) control insects in farm-stored corn intended for human consumption; & (3) investigate simple, practical procedures in producing clean corn meal from corn available in the state.
Ent. 104

D. Diseases and Insects

Ark.

Biology and Control of the Southwestern Corn Borer in Arkansas. (1) Further development of cultural & insecticidal control for southwestern corn borer. Project will include a study of severity of damage in different areas of state.

Ent., Agron. 350

Ark.

Abundance of Corn Earworm in Relation to Hosts, Biological Control Agents and Physical Environment. (1) Seek causes of fluctuation in field populations of corn earworm in corn & in other available hosts. (2) Study effect of climate. (3) Analyze the effect of predators, parasites, & diseases & further investigate host abundance to seasonal population fluctuations.

Ent. 450

Ill.

Etiology of Pathogenic Organisms Associated with Corn Stalk Rot. To learn (1) pathogenicity of species isolated from corn stalk rots; (2) age of corn plant in which infection begins; (3) mode & source of infection & site of initial infection; (4) possible interaction of different fungi in relation to initial infection.

Pl. Path. 68-351

Iowa

The Effect of Time of Planting, Weather Conditions and Character of Plant Growth on Corn Borer Populations. To (1) study differences in resistance or susceptibility between widely different strains of field corn planted at widely different dates & for both generations of borer; (2) study effect of planting date on both first & second generation borer accumulation; & (3) measure damage done per borer, by first & second generation borers, & by total borers, under different infestation levels, & for different strains of field corn.

Ent. 1193 (NC-20) Coop. ARS (Also see Part 7, Section a.)

Iowa

Radioisotopes as a Tool in Mode of Action Studies of Modern Insecticides Used Against the European Corn Borer and Other Agricultural Pests. To (1) determine metabolism of radioactive DDT, alone and combined with synergists, in European corn borer, in house fly, and other resistant and non-resistant strains of insects; and (2) study action, residues, and metabolism of radioactive systemic insecticides in European corn borer, corn plants, the house fly, and the rat.

Zool., Ent. 1256 (NC-19) (Also see Part 7, Section d.)

Kans. The Corn Earworm and Other Insects. To (1) study infestation of corn earworm and other insects as to abundance in fields as related to climatic conditions and farm practices, (2) determine life history and habits of injurious insects in corn fields, and (3) study control measures, cultural and insecticidal, for various pests.
Ent. 284

Kans. Factors Influencing European Corn Borer Populations. Measure annual populations & observe changes in population in Kansas as compared to other north-central states; learn presence or absence of syncronization of changes in population; & study influence of weather conditions, biotic-controlling factors & soil management on borer populations.
Ent., Agron. 440 (NC-20) (Also see Part 7, Section a.)

Ky. Life History and Control of the European Corn Borer (Pyrausta Nubilalis) with Special Reference to Field Corn. To (1) learn habits of corn borer under Ky. conditions, number of generations a year, relative damage to field corn on different dates & comparative resistance of new & old inbred, single cross, & double cross corns to attack; (2) aid in control by distributing borer parasites & making parasite surveys, (3) find out extent of spread & abundance of corn borer, & (4) find out what other hosts are attacked besides corn.
Ent., Bot. 452

Ky. Biology and Control of Soil Insects Attacking Corn and Studies of the Effects of Soil Insecticides on Corn. To (1) determine relative harmful effects of soil insect pests of corn; (2) study relationships of crop rotations or cultural practices with soil-insect populations; (3) evaluate control measures; (4) study effects of insecticide-fertilizer combinations on the corn plant; and (5) study effect of insecticides on development of the plant.
Ent., Agron. 453

Minn. Causes of Insect Outbreaks.--1. Factors Affecting Populations of European Corn Borer. To (1) make an annual census of borer abundance together with measurements of major factors of weather & biotic factors which affect borer abundance: (2) carry out experimental work aimed at elucidating operation of weather biotic, agronomic, & soil factors on borer abundance; & (3) study effect of plant characteristics such as development, genetic make-up, & physiotic conditions on the level of abundance of borers in the corn plant.
Ent., Zool., Agron., Pl. Genet., Soils 1726 (NC-20) Coop. ARS (Also see Part 7, Section a.)

Miss. Corn Disease Investigations in Relation to Breeding for Resistance. Evaluate existing inbred & hybrid lines for resistance to following: physoderma brown spot, northern corn leaf blight, common corn smut, southern corn leaf blight, helminthosporium leaf spot & ear rot, seedling blight, & other diseases. Incorporate resistance to these diseases into inbred lines being developed. Improve old & develop new techniques for rapid & efficient testing of disease resistance.
Pl. Path., Agron. HL-14

Mo. Corn Insects, with Special Emphasis on Soil Insects, the Corn Earworm, the Southwestern Corn Borer and Occasional Pests. (1) Study soil insects & arthropods with emphasis on distribution, life cycle, & destructiveness of wireworms, rootworms, cutworms, flea beetles, mites, Collembola & other arthropods. (2) Search for corn plasm resistant to Southwestern corn borer. (3) Breed field corn for resistance to corn earworm. (4) Uniform National Insecticide Control Test on corn earworm. (5) Study biology & control of occasional pests of corn that have not been of importance.
Ent., Field Crops 269 Coop. ARS

Mo. The European Corn Borer with Special Emphasis on the Biology, Parasite and Chemical Control and Importance of the Pest in Missouri. Study factors influencing borer population as weather, & biotic controlling factors, & follow annual changes in abundance of borer & compare with other states. Collect & study parasites of borer. Evaluate insecticide control on early, mid-season & late planted corn. Collect data to learn actual reduction in yield of corn in Missouri brought about by typical low infestations of 1st & 2nd generation borers.
Ent., Field Crops 270 Coop. ARS

Nebr. Annual Census of European Corn Borer Populations. To study (1) annual changes in abundance of borer in 2 counties for a period of several years, (2) influence of weather conditions, biotic controlling factors, soil management, & irrigation practices on borer populations, (3) presence of, or lack of synchronization of, changes of borer populations in state & other study areas in North Central States.
Ent., Agron. 508 (NC-20) Coop. ARS (Also see Part 7, Section a.)

N. J.

Studies on Diseases of Field Corn. To learn extent of, & control measures for, root & stalk rot; effect of fertilizers on incidence of these diseases; species of leaf blight in state, source of inoculation, & conditions favoring its spread.

Pl. Path., Agron. 476

N. Y.
(Cornell)

Diseases of Field Corn.--1. Stalk Rot Disease of Field Corn. 2. Seed Decay and Seedling Blight. To make a survey of the corn disease problems in New York state; study those of the most economic importance; and conduct experimentation in an effort to devise an adequate control program.

Pl. Path. 131 1 & 2

N. C.

The Ecology, Cultural and Chemical Control of Insect Pests of Field Corn. To determine life history of more important insects of field corn & best chemical & cultural methods for their control. 1. Corn wireworm. 2. the corn billbug, 3. corn leaf aphid & 4. other pests that occur on corn, or any which become epidemic on corn.

Ent. 44

Ohio

The Insect Phases of the Corn Research Program. To (1) identify & obtain information on relative importance of factors influencing abundance of borers in corn plant; & (2) gain better understanding of relationships of environmental factors to fluctuations, oscillations, & levels of abundance of corn borer populations.

Ent., Agron., Bot., Pl. Path. 111 (NC-20) (Also see Part 7, Section a.)

Ohio

Ecological Study of the Red-Winged Blackbird as it is Related to the Damage of Crops. (1) Conduct an ecological study of the Red-Winged Blackbird to obtain clues to its control in crops. (2) Study its reaction in plots of corn for clues to its control by use of resistant varieties, planting dates, or various treatments.

Ent. 171

Pa.

Disease Resistance in Corn. To (1) continue to produce disease-resistant inbred lines of value to Pa. corn breeding program; (2) continue to develop & refine techniques for screening resistant material from open pollinated & hybrid populations; & (3) conduct fundamental studies on nature of disease resistance, on factors influencing it, & on its inheritance.

Bot., Agron. 911-B

Pa. Resistance of Hybrid Corn to Insects. To (1) develop new & improve present techniques to evaluate hybrid corn resistance &/or tolerance to these insects: European corn borer, corn leaf aphid, Japanese beetle, southern corn rootworm, seed corn maggot, thrips, seed corn beetle, & wireworms; (2) evaluate field plot corn to establish its resistance &/or tolerance to insects listed above; & (3) study influence of environmental factors on resistance, &/or tolerance of hybrid corn to insects listed above.
Zool., Ent. 911-C

S. C. Bionomics and Control of Heliothis Armigera (Hubner) as a Pest of Corn and Tomatoes. To determine factors in life history of the insect influencing its control, study physical properties of diluents and ways in which their effectiveness and usefulness may be increased, and test under field conditions combinations of chemicals and diluents showing promise of control in laboratory studies.
Ent. 123

S. Dak. The European Corn Borer in South Dakota.--Its Control, Life History and Distribution. To (1) determine extent and degree of infestation of the insect, (2) study life history under S. D. conditions, (3) study parasites and predators with a view toward introduction of new species into the state for biological control of the pest, and (4) on the basis of above information determine best combination of control measures.
Ent. 187 (NC-20) (Also see Part 7, Section a.)

S. Dak. Investigations of the Corn Rootworm Complex (Diabrotica SPP) in South Dakota, Their Economic Importance, Life Histories, Distribution and Control. To (1) learn extent & degree of infestation of corn rootworms in South Dakota; (2) learn economic importance of the insects to the corn growers of the state; (3) study life histories under South Dakota conditions; & (4) learn best combinations of control measures with which to combat corn rootworms in South Dakota.
Ent., Zool. 247

Va. Physiology of Disease Resistance of Corn and Tobacco. To (1) work out biochemical or biological lab method to test tobacco for resistance to black shank disease & corn for resistance to certain fungus diseases; (2) correlate, if possible, resistance of corn to certain fungus pathogens with physiological processes which are initiated by specific genes; (3) undertake comprehensive study of physiology of pathogens which cause black shank disease of tobacco & corn leaf blight; & (4) obtain better understanding of causes of disease resistance & physiology of parasitism.
Pl. Path., Physiol. 86019

Va. Diseases of Corn and Breeding of Disease-Resistant Varieties of Hybrid Corn. To (1) develop inbred lines & hybrid varieties of corn with resistance to leaf blight, stalk rot, root rot, rust & smut; (2) culture organisms causing diseases of corn & learn effects of environment on them; (3) study genetics of pathogenicity & variations of causal organisms & related phenomena; (4) develop methods for control of corn diseases & to promote use of known methods; & (5) study inheritance of resistance to corn diseases.
Pl. Path., Physiol. 86058

Va. Control of Subterranean Insects Affecting Seedling Corn. To learn (1) efficiency of following procedures: a treating seed with an insecticide prior to planting; b insecticides in granulated form or as sprays applied in row; c insecticide-fungicide combinations as seed treatments, (2) effects by observation of more promising soil insecticides & seed protectants on seed germination & plant growth, (3) effect upon final yields of corn obtained from controlling said insects.
Ent., Agron. 86065

Wis. Host Plant Resistance to the European Corn Borer. To learn (1) factors affecting survival & establishment of European corn borer larvae on corn plants, (2) relative importance of factors in varietal differences in susceptibility to corn borer.
Ent., Zool., Field Crops 958

E. Economics and Marketing

Iowa Measurement and Appraisal of the Effects of the Corn Price and Acreage Control Program. To (1) analyze objectives of corn price & acreage control program, (2) examine methods used to attain objectives, (3) learn effects of program on: a acreage, yield, & production of corn & other feed crops, & livestock, b storage stocks of corn & other feed crops, & livestock, & c prices of corn & other feed crops, & livestock, (4) compare effects of program with its objectives, (5) estimate effect of various proposed alternative programs. (6) Measure & appraise impact of corn & other grain price storage programs on grain trade.
Agr. Econ., Rur. Sociol. 1241 (NCM-11) Coop. AMS, ARS
(Also see Part 2, Section a.)

Ky. An Economic Study of Nitrogen and Potassium Fertilization of Corn. To determine (1) most profitable rate of N application with K held constant at various levels; (2) most profitable rate of K application with N held constant at different levels; (3) least cost nutrient (N & K) combination for yields at different levels; & (4) economics of residual effects of above fertilizer applications on succeeding corn crops.
Agron., Agr. Econ. 21

IV. OATS

Ind.

Oat Breeding, Genetics and Pathology. (1) Develop & evaluate new varieties of spring & winter oats superior in yielding ability, standing ability, quality, & winter hardiness & resistance to crown rust, stem rust, loose & covered smuts, Helminthosporium blights, red leaf, & Septoria black stem diseases. (2) Learn nature of inheritance of morphological & physiological characters & of disease resistance; (3) Learn economic importance, epidemiology, & physiologic specialization of causal organisms of diseases attacking oats, (4) evaluate resistance of various types from different sources in relation to diseases concerned
Bot., Pl. Path., Agron. 819 Coop. ARS

Iowa

Development of Improved Oat Varieties. Continue improvement of oats by conducting basic & applied research: (1) develop by hybridization & subsequent selection & evaluation, new superior strains; evaluate mutagenic agents; develop new breeding systems for evaluation of hybrid progenies. (2) Evaluate new varieties & selections for inherent resistance to specific races of disease organisms; isolate new sources of disease resistance & chart changes in structure of pathogen populations, study host-parasite relations, devise new method of testing for disease resistance, of determining evolutionary systems in oat disease organisms & of use of fungicides. (3) Study inter- & intra-specific hybrids as a means to transfer genes to economic species of oats; develop a monosomic series of testers; learn nature & causes for spontaneous variation in certain varieties developed by hybridization; (4) Learn heritability values for various characters & from data construct selection indices; study components of variance from experimental trials; (5) Learn ranges in amino acids & other properties of oat grain of importance in animal nutrition; (6) Provide breeding materials for use in physiologic studies.
Agron., Bot., Pl. Path. 1176

Ky.

The Nature of Resistance and Susceptibility of Oats to Crown and Stem Rust. To determine differential growth requirements of rusts which lead to specie and racial specialization.
Agron. 169

La. Oat Breeding. Primary objective will be to develop varieties of oats which are particularly well adapted to different soil and climatic areas of La.
Crops, Soils 373 Coop. USDA

Maine Breeding Spring Oats for Higher Yields. (1) Develop higher yielding varieties & strains of spring oats. (2) Investigate techniques for evaluation of a small grain for yield in early generations following hybridization. (3) Obtain information on inheritance of yield in oats.
Agron., Pl. Path. 58 (NE-23)

Mich. The Breeding of Superior Oat Varieties. (1) Stabilize variety recommendations thru an understanding of major factors in genotype-environment interactions. Develop: (2) superior oat varieties for given localities, e.g., late, white oat varieties for areas of the "thumb," & high night temperature types for Lenawee County; (3) varieties of oats tolerant to Red Leaf & resistant to *Septoria* as well as to prevalent races of leaf & stem rust; (4) greatly improved lodging resistance to take advantage of increased use of fertilizer. (5) Continue fundamental studies on geometry of yield, particularly as related to heterosis. (6) Measure force of environment on genotype by vector analysis.
Farm Crops, Bot., Pl. Path. 50

Miss. Production of Disease Resistant and Cold Resistant Varieties of Oats Adaptable to Mississippi. To (1) develop varieties of oats resistant to major diseases of Miss., & having enough cold resistance to supply adequate grazing thru the winter; & (2) evaluate selected varieties & strains for grain yields, resistance to old & new diseases, & to cold injury, at several Branch Stations in the state.
Pl. Path. & Physiol. HL-2 Coop. ARS

Miss. Cause of Spikelet Drop in Oats. To investigate nature of certain new and destructive diseases of small grains in Mississippi with particular emphasis on "Spikelet Drop of Oats."
Pl. Path. & Physiol. HL-4

Mo.

Breeding Better Oats for Missouri.--a. --Breeding and Testing New Strains of Oats for Missouri. To (1) compare best new experimental strains with standard varieties in search for new varieties, improved in yield, straw qualities, and disease resistance; (2) develop varieties with superior disease resistance, especially to those diseases which are constantly changing as a result of changing physiologic races; and (3) develop varieties with superior resistance to lodging by improving straw strength as well as type of root development.
Field Crops 203 Coop. ARS

Mont.

Oat Improvement by Breeding, Selection and Testing. To (1) develop thru breeding superior oat varieties with respect to yield, quality, & other desirable agronomic characteristics; (2) test adaptability of new & introduced oat varieties & selections for Mont.; & (3) provide information relative to improvement of cultural practices & production techniques.
Agron. 142 929 Coop. ARS

N. Y.
(Cornell)

Diseases of Small Grains, Virus Diseases of Oats and Other Cereals. Identify & differentiate the kinds & strains of viruses attacking oats, study their importance, aid in development of improved techniques for these studies.
Pl. Path. 132-8 Coop. ARS

N. C.

The Development of Winter Oat Varieties with High Yields of Good Quality Grain and with Resistance to Diseases, to Winter Injury and to Lodging. To (1) develop thru breeding, varieties or strains of oats combining the following: a. resistance to crown rust, smut, mosaic, and Helminthosporium diseases; b. varieties with stiff straw and with enough winter hardiness to be grown thru the State with exception of very high mountain areas; and c. good yields of high quality grain; (2) evaluate promising new strains from above breeding program, or which may be available from ARS, or other experiment stations; and (3) make survey of oat germ plasm to find types which may contribute to above breeding program.
Agron. 55

Ohio

Oat Breeding and Testing. To (1) develop better varieties of spring & winter oats for Ohio & comparable areas; (2) inform producers of superior & also inferior oat varieties; & (3) develop new concepts & techniques which are needed in this & related fields.
Agron. 32

Okla. Oat Diseases and Their Control. To (1) develop adequate tests for resistance to crown & stem rust & anthracnose; (2) develop root disease garden where strains of oats can be tested for resistance to root organisms; (3) study variability of Collectotricum graminicolum & host range of the fungus; (4) study temperature & moisture needs of infection & disease development; & (5) closely observe breeding nurseries & commercial plantings for new diseases, or for serious outbreaks of diseases usually considered minor.
Pl. Path., Agron. 598 Coop. ARS

Tenn. Oat Breeding. (1) To improve a winter-hardy oat adapted to Tennessee conditions by hybridization & selection; (2) to obtain a more desirable spring oat resistant to crown rust; & (3) to make genetic studies of characters, strong vs. weak straw, heavy vs. light kernels, resistance vs. non-resistance in the form of crown rust common to this section.
Bot. 80

Tex. Oat Improvement. To (1) develop or discover new varieties of oats superior to present varieties, & adapted to producing of grain, forage or a combination of the two from fall or spring seeding, (2) study cold resistance or tolerance of varieties & strains, (3) develop oat varieties resistant to crown rust, stem rust, & Helminthosporium blight, etc., (4) study forage & feed quality characteristics of oat varieties & strains under several environmental conditions, & develop varieties especially adapted for grain, winter pasture, hay or oat silage, (5) search for oat germ plasm resistant to greenbugs, (6) cooperate in regional trials, (7) study wild & cultivated species related to common oats for characteristics of value.
Agron., Pl. Physiol. & Path. 1027 Coop. ARS

Va. Development of Oat Varieties Adapted to the Coastal Plains Region of Virginia. To develop (1) varieties of oats specifically adapted in growth type to eastern Virginia, high yielding, high in grain quality as measured by bushel test weight, stiff strawed, & resistant to major oat diseases of eastern Virginia; (2) varieties which produce high forage yields for grazing in fall & early spring, & are satisfactory for grazing production either when properly grazed or not grazed; & (3) varieties specifically adapted to high grain production when planted in late winter.
Agron. 86052 Coop. ARS

Wyo. Breeding and Selection Studies with Oats. To (1) develop improved varieties, outstanding for yield, agronomic characters, a disease & insect resistance; (2) determine & recommend outstanding varieties for Wyoming production; & (3) be responsible for a source of genetically pure breeders seed of recommended, named, released varieties thru the Station & Wyoming Crop Improvement Assn., to the Wyoming public.
Agron., Agr. Econ. 490

V. RICE

Ark. Nutritional Improvement of Rice and Rice Diets. To learn (1) effect of replacing some of protein in brown, milled, enriched, parboiled, & converted rice with proteins of animal & vegetable origin & effect of additional proteins; (2) availability of amino acids of proteins of rice & its by-products; (3) effect of germination of rice on proteins, amino acid, & vitamin content & compare results obtained with those obtained in germination of oats. (4) Conduct breeding experiments with rice to produce a strain with higher protein content.
Agr. Chem. 101 Coop. USDA

Ark. Ground Water Resources and Recharge in the Rice Growing Area of Arkansas. To learn (1) by use of a vertical well hydrologic conditions set up in recharge; (2) effect of chemical compatibility & bacteriological contamination; (3) amount of surface filtration & other treatments necessary for successful recharge using surface water. (4) Estimate cost of artificial recharge using results of projects as a basis for these determinations. (5) Check depth-to-water in irrigation wells of rice-growing areas to learn water level trends & verify or disprove safe yield calculations previously made.
Agr. Engin. 106 Coop. USDI-Geo. Svy., Dept. of the Army

Ark. An Economic Appraisal of Production Practices and Enterprise Combinations on Rice Farms in Arkansas. To (1) relate relative efficiency of producing rice & other adapted crops to major soil & water resources situations on rice farms, (2) appraise costs & returns effect of irrigation of crops other than rice for each major resource situation, (3) appraise costs & returns potentials from adoption of best combination of improved production practices & techniques for each major resource situation, (4) evaluate costs & returns aspects of rotations on rice farms for each major resource situation, & (5) learn relative inputs & yields for long, medium, & short grain varieties of rice.
Agr. Econ., Agron. 390 Coop. ARS

Ark. Studies of Physiological Factors that Influence the Nutritional Balance and Development of the Rice Plant. (1) to learn nutrient deficiency symptoms & correlate tissue analysis with these deficiency symptoms, (2) learn possible relationship between mineral balance & straighthead of rice, (3) study effects of soil alkalinity on nutritional balance of plant, (4) learn effect of cultural practices as spacing, variety & water management on rice development.
Agron., Pl. Path. 397 Coop. ARS

Ark. *Weed Control in Rice Production*. (1) Develop either a cultural, chemical, or a combination method for controlling *Echinochloa crusgalli*. (2) Evaluate herbicides for controlling *Sesbania macrocarpa*, *Aeschynomene virginica*, *Heteranther limosa* & other weeds infesting rice fields. (3) Study tolerance of rice to various herbicides. (4) Study the physiological & morphological characteristics of rice as influenced by herbicides. (5) Study methods of controlling weeds infesting rice field canals.
Agron. 419

Ark. *The Effect of Drying Pack Thickness Upon Head Rice Yields and Germination*. Learn maximum & optimum thickness for rice drying pack, or bed, where rice is moving & where it is static.
Agr. Econ. 434

Ark. *The Effects of Variations in Moisture, Temperature, and Time During the Drying and Storage Process Upon the Market Value of Rice*. To reduce (1) amount of checking in conditioning & drying processes & thereby increase market value of rice; (2) time required to condition & dry a given lot of rice & thereby reduce amount of storage damage during & after drying.
Agr. Engin., Agr. Econ. & Rur. Sociol. 435

Ark. *The Influence of Cultural Practice Combinations on Rice Production*. (1) Explore effects of water management practices on yield as influenced by seeding methods, depth of water, method of irrigation, draining, & agricultural chemical aids. (2) Study influence of organic residues, aeration, & acidity on availability of nutrient elements & resultant effects on growth & development of rice plant.
Agron. 443

Ark. *Control of Rice Diseases*. (1) Develop new disease resistant rice varieties. (2) Find more effective seed treatment compounds. (3) Learn cause & develop control measures for "rice yellows."
Pl. Path. 455 Coop. ARS

La. *Stored Grain Insects with Special Emphasis on Those Infesting Rice, Especially the Rice Weevil*. To perfect effective, practical & economical control measures suitable for storage conditions and requirements in La., embracing: 1. biology of rice weevil and other species; 2. ecological factors affecting species as pests; 3. seasonal habits; 4. varietal resistance; 5. control.
Ent. 827 Coop. ARS

La. *Cytogenetic Research in Rice*. (1) Learn if partial sterility which occurs in hybrids between *indica* & *japonica* forms of cultivated rice, *Oryza sativa*, is caused by structural differences in chromosomes. (2) Study nature of any chromosome structural differences found in *indica* x *japonica* hybrids & learn effects of structural differences on sterility. (3) Study chromosome relationships between cultivated rice, *Oryza sativa*, & other species of genus *Oryza*. (4) Try to get more data on origin of cultivated rice.
Agron. 893 Coop. ARS

La. *Studies on the Kernel Smut of Rice*. (1) Develop a suitable method of artificial inoculation of rice. (2) Study genetics of fungus & learn if diploid stage is the only stage in which fungus is capable of inciting infection.
Pl. Path. 933

La. *Fungi Causing Light and Sterile Grains in Rice*. (1) Learn to what extent these fungi are responsible for light & sterile grains in rice. (2) Study mechanism of infection & subsequent disease in rice. (3) Screen rice varieties for resistance to these fungi, emphasizing Dr. Wheeler's technique.
Pl. Path. 934

Tex. *An Evaluation of the Rice Price Support Program*. To (1) measure & appraise effects of federal price support, agricultural adjustment & surplus removal programs upon supply, domestic & foreign consumption, markets & prices & gross incomes for rice, (2) measure & appraise effects of rice program in terms of concurrent changes in farm enterprise combinations, market systems, & interrelationships of product & factor prices for rice & (3) study interconnections of programs for rice with programs for other farm commodities important in the South's agriculture, & to examine the interaction of effects of such programs.
Agr. Econ., Rur. Sociol. 942 (SM-14) (Also see Part 2, Section a.)

Tex. *Drying and Storing Rice in Farm Storage Bins in Texas*. Drying with unheated air. To (1) determine effect of rates of air flow thru stored rice of different initial moisture contents & at various depths on: rate of moisture removal, power needs, germination, infestation by microbiological organisms, fat acidity, milling quality, (2) modify present air distribution systems as indicated by research, & check uniformity of air distribution throughout the rice, (3) revise operating procedures for drying rice with unheated air. *Storing dry rice*. To determine (1) practicability of using forced ventilation for maintaining quality during storage, (2) effective means of controlling insects, (3) practical & economical methods of moving rice during drying & in & out of storage, & (4) effects of moisture, temperature & different storage procedures of microbiological infestation

Agr. Engin., Agron. 1002 Coop. AMS, ARS

VI. SORGHUM

Ariz. *Breeding Sorghums for Increased Uniformity in the Field and for Improved Agronomic Characteristics and Increased Production of Grain and Forage*. To (1) discover cause of and reduce variation in height of Early Hegari, Martin's Milo, and certain other sorghums produced under certification, (2) develop thru breeding methods improved adapted varieties of grain sorghums and sorgos for local use as feeds or by industry; and (3) study inheritance of important genetic characters in sorghum plant.

Pl. Brdg. 309

Ark. *Improvement and Management of Sorghums*. (1) Develop or improve thru breeding, introduction, & selection, varieties or hybrids with high yielding ability suited to State conditions: grain sorghum, forage sorghum, pearl millet & sudan, perennial sorghum. (2) Develop new & improved present management practices as: methods of planting after small grain harvest, overseeding grain sorghum with a crop for fall & winter grazing, establishment & maintenance of perennial sorghum.

Agron. 457

Colo. *Sorghum Improvement*. (1) Improve yields & quality of grain sorghums, forage sorghums, Sudangrass, & broomcorn for dryland & irrigated conditions in Colorado by breeding & cultural methods. (2) Maintain seed stocks of recommended varieties or hybrids of sorghums released to growers within the State. (3) Experiment with cultural practices as: rotations or crop sequence, seed treatment, seeding practices, etc.

Agron. 15

Ga. Variety Testing, Breeding, and Culture of Grain Sorghums in Georgia. To (1) determine adaptation of existing varieties & strains, (2) breed varieties for high yielding ability, disease resistance, quality, & other agronomic characters & investigate feasibility of developing grain sorghum hybrids for commercial production, (3) learn proper planting date for grain sorghums, (4) learn proper row spacing & seeding rate, (5) learn most economical fertilizer practice, (6) learn varietal types best suited for combining & effect combining has on grain moisture content, & (7) evaluate insect damage & devise control means.
Agron. 30

Ga. Biology and Control of Insect Pests of Grain Sorghum. (1) Learn important insect pests of grain sorghum. (2) Develop insecticidal & cultural control measures. (3) Study biological & ecological aspects of economic grain sorghum insects.
Ent. 69

Ga. Diseases of Grain Sorghum. (1) Learn identity, distribution, & relative importance of diseases on grain sorghum. (2) Obtain basic information on diseases as head molds which have not been fully investigated elsewhere. (3) Learn physiological races of smuts present, & develop more satisfactory methods of artificial inoculation. (4) Assess sorghum varieties for disease resistance & give breeders technical assistance in screening selections. (5) Learn value of seed treatment in improving stands & yields & controlling diseases.
Pl. Path. 105

Ind. Breeding, Genetics, and Testing of Silage, Grain and Pasture Type Sorghums Adapted to Indiana. (1) Test present & new varieties (including hybrids) of silage, grain, & pasture types of sorghums. (2) Breed & improve each of types to provide new varieties. (3) Conduct basic genetic studies of specific characters.
Agron. 885

Kans. Fundamental Nutrition Studies of Sorghum Roughages and Grains.--II, A Study of the Digestibility of Sorghum Silage. To determine the coefficients of digestibility of sorghum silage when fed alone and in conjunction with a high-protein concentrate.
Anim. Husb., Chem. 222-2

Kans. Biology and Control of Insects Affecting Sorghums. Learn behavior, type & extent of injury, & control of insects attacking sorghum.

Ent. 432

Kans. Sorghum Breeding and Testing. (1) develop grain & forage sorghums adapted to State. Produce for commercial use superior varieties &/or hybrids having high yield, good quality, standability, drought resistance, & other desirable agronomic characteristics; resistance to milo disease, sorghum smuts, leaf diseases, & other diseases which may become serious; resistance to chinch bugs, corn leaf aphids, & other potentially damaging insects. (2) Conduct research problems to improve breeding methods.

Agron., Bot., Pl. Path., Ent. 462 Coop. ARS

Ky. The Improvement of Sorghum for Sirup, Forage and Grain Through Breeding and Production Practices. (1) Evaluate grain, forage, & sirup varieties & experimental selections of sorghum for adaptability & yield. (2) Improve varieties thru breeding. (3) Study relationship of production & harvesting to yield & quality of sirup.

Agron. 156 Coop. ARS

Miss. The Genetic Improvement of Grain Sorghum for Production Under Humid Conditions. To develop superior varieties of grain sorghum adapted to soil & climatic conditions of this state.

Agron. HC-5

Miss. Control of Insects Affecting the Production of Sorgo and Grain Sorghum Seed. To (1) evaluate damage done to heads of sorgo & sorghum by each species of insect in various parts of the state; (2) make seasonal history studies on species of insects, needed to work out controls; (3) note relative rate of infestation of various species on variation varieties & selections of sorgo & sorghum in efforts to find plant material resistant to insects; (4) study effect of agronomic practices which may lead to growing sorghums with least insect injury to heads; & (5) conduct toxicological studies to work out practical control of insects after using best cultural methods.

Zool., Ent. HH-10

Nebr. A Study of the Adaptation, Improvement, and Culture of Grain and Forage Sorghums. Develop (1) improved varieties for grain, forages, & industrial use; (2) methods for producing commercial hybrid seed. Learn (3) cultural needs for new improved varieties; (3) chemical & physical characteristics of varieties in relation to their adaptation, behavior, & use. (5) Develop or evaluate insect & disease control methods, emphasizing control of chinch bug, charcoal rot, & head smut. (6) Make genetic & cytogenetic studies.

Agron. 228 Coop. ARS

N. Mex. The Economics of Marketing Alfalfa Hay and Grain Sorghums in New Mexico. To (1) learn movement of alfalfa hay & feed grains within, out of, & into N. M. & surrounding states, (2) learn marketing & transportation methods used, (3) analyze marketing functions performed & costs & margins incurred, & (4) learn role of feed processors as a demand factor for N. M. alfalfa hay & grain sorghums.

Agr. Econ. 30 (WM-20) (Also see Part 14, Section a.)

Okla. Sorghum Breeding Investigations- The Development of Improved Varieties of Sorghums. To (1) develop by breeding: a dwarf quick-maturing high yielding kafir; a combine milo-kafir resistant to lodging, chinch bug damage & grain weathering; improved dwarf kafir, more resistant to lodging, insect damage & grain weathering & with heads ripening before stalks, than is found in other varieties; a dwarf combine sorghum for eastern Oklahoma; & forage & sirup sorghums resistant to leaf-spot disease & lodging; (2) study possibilities of hybrid sorghum seed development; & (3) determine reactions of the several sorghum varieties to insects.

Agron., Ent. 400 Coop. ARS

Okla. Disease Resistance in Sorghums. To incorporate resistance to the leading sorghum diseases in the new sorghum varieties to replace disease-susceptible standard varieties in the Southwest; thus to reduce the annual losses of 10 to 20 per cent now suffered in sorghum production in this area as a result of sorghum diseases.

Agron., Pl. Path. 481 Coop. ARS

Okla. Management of Soils for Sorghum Production. (1) Ascertain influence of added N, P, & K on grain & forage sorghum production; correlate soil tests for P & K with yield & response from added N, P, & K; compare sources of N & P on grain & forage sorghum production; ascertain residual effects of N, P, & K. (2) Study soil moisture use under several soil fertility & climatic regimes, & fertilizer irrigation interaction. (3) Study depth & lateral displacement of fertilizer as it affects stand, time & rate of seedling emergence, salt injury, & yields. (4) Study sorghum production in several cropping systems & influence of cropping systems on: moisture use & storage thru year, & organic matter maintenance & soil structure.

Agron. 962

S. Dak.

Breeding and Testing Forage and Grain Sorghums and Sudan Grass. To develop, (1) grain sorghums adapted for climatic conditions of state, (2) forage sorghums & sudan grass low in hydrocyanic acid, early maturing & produce high yield of high quality palatable forage, (3) dual purpose large-seeded grain & sweet stalked forage types, low in hydrocyanic acid for silage & fodder, (4) male sterile lines & recover lines for hybrid sorghums, (5) new variants using colchicine, radiation, etc., (6) & evaluate agronomic factors & adaptability of sorghums & sudan grass under climatic & environmental conditions of state.

Agron. 61

Tex.

Inheritance of Sorghum. To (1) learn inheritance of characters in sorghum & their linkage relations as basis for further crop improvement; (2) learn nature & inheritance of certain physiological reactions in sorghum such as those to temperature & photo-period & evaluate effect of reactions on adaptation of varieties; (3) learn role of certain physiological reactions in expression of heterosis in sorghum; (4) classify varieties & strains for genes important in choice of parents for breeding programs & for use in sorghum hybrids; & (5) make cytogenetic & genetic studies on mechanisms of sterility & relations of perennial to annual legumes.

Agron. 498 Coop. ARS

Tex.

Breeding and Improvement in Sorghum. To (1) improve upon present varieties of sorghum & to develop new & useful varieties thru hybridization, backcrossing, & selection; & (2) develop numerous useful strains for practical use of the phenomenon of hybrid vigor in connection with procedures for development of sorghum hybrids being worked out under project 610.

Agron. 499 Coop. ARS

Tex.

Drying and Storing Sorghum Grains in Farm Storage Bins in South Texas. 1. In drying with unheated air, to determine effect of various rates of air flow thru stored grain of different initial moisture contents & at various depths on the following: rate of moisture removal, power needs, germination, infestation by microbiological organisms, fat acidity, & market grade; to modify existing air distribution systems as indicated by previous research & check uniformity of air distribution throughout the mass of grain; & to revise operating procedures for drying grain with unheated air; 2. In storing dry grains: learn minimum air flow needs for maintaining high quality grain with mechanical ventilation; establish operating procedures & use of automatic controls for aerating grain during storage; learn practical & economical methods of handling grain in & out of storage; learn effective means of controlling insects; & learn effects of moisture, temperature & different storage procedures on microbiological infestation.

Agr. Engin. 1001 Coop. AMS, ARS

Tex.

The Impact of Federal Price Support Programs on the Grain Sorghum Industry. Measure & appraise effects of (1) federal price supports, acreage adjustment, & surplus removal program upon the supply, storage, prices, markets & use of grain sorghum; (2) cotton acreage adjustments & grain sorghum price programs on supply of grain sorghum.
Agr. Econ., Rur. Sociol. 1123 (SM-14) Coop. USDA
(Also see Part 2, Section a.)

VII. WHEAT

A. Varieties, Breeding and Genetics

Idaho

Wheat Breeding for Disease Resistance and Quality. To (1) systematically add rust & smut resistance to those wheats widely grown in Idaho which are not being improved by neighboring states; (2) incorporate a shorter, stronger straw into our better wheats; & (3) conduct preliminary investigations in the inheritance of several genetic unknowns in wheat, particularly quality.
Agron. 220

Ind.

Soft Winter Wheat Breeding, Genetics, and Pathology. (1) Develop highly productive, pastry quality soft winter wheat varieties, adapted to production under high fertility conditions & resistant to weather, disease, & insect hazards. (2) Learn relations & interrelations of plant characters with respect to yield & adaptation. (3) Analyze inheritance of plant characters contributing to field performance; (4) resistance to hessian fly & wheat diseases. (5) Evaluate superior sources of & characterize resistance to major diseases & insects. (6) Provide data on significance, epidemiology, & genetics of virulence of causal organisms. (7) Evaluate chemical & physical methods of disease control.
Bot., Pl. Path., Agron. 969 Coop. ARS

Kans.

Cytogenetic Studies of Wheat and Related Species and General. To study (1) cytogenetics of wheat with emphasis on hard red winter wheat; (2) chromosome stability, normality, or irregularities of wheats used as parents in Kansas wheat breeding program; (3) relation of cytologic condition to inheritance of genetic characters; (4) cytology and genetics of species and genera related to wheat and of interspecific and intergeneric hybrids.
Bot., Pl. Path. 350

Kans. Genetic and Applied Cytogenetic Investigations of Farm Crops. To (1) study mode of inheritance of important characters in farm crops to facilitate breeding and selection work in such crops; (2) study chromosomal numbers and behavior in various crop plants and their polyploid, interspecific, or intergeneric hybrid derivatives; and aid in isolation of meiotically stable segregates with desired chromosome numbers; and (3) investigate use of ionizing and related radiations and chemicals for production of favorable mutations and/or polyploids in crop plants.
Agron. 373 Coop. ARS

Kans. Wheat Breeding and Testing. Develop improved varieties of wheat for State, conduct nursery test of these varieties thru State. Conduct research studies to improve breeding methods & obtain genetic information.
Agron., Bot., Pl. Path., Ent. 463 Coop. ARS

Md. Wheat Improvement for Maryland. To (1) discover or originate better varieties of wheat for Maryland; (2) evaluate more accurately the adaptation of improved varieties to several wheat areas; (3) evaluate varieties for use of high soil fertility levels; (4) evaluate varieties for tolerance to 2,4-D & other chemicals for weed control; & (5) study trend of performance of old varieties and composite populations from year to year.
Agron. B-66 Coop. ARS

Minn. Cytology in Relation to Genetics. To (1) determine why certain species as wheat and others show low sterility and directed segregation, while some show higher sterility and non-directed segregation to correlate genetic and cytological behavior, (2) produce cytogenetic tools for study of these problems using mutagenic agents, (3) determine behavior as ring size is increased in corn, eventually to synthesize a pure stock, (4) determine cytogenetic basis for sterility in crop plants, and (5) build up knowledge of genetic linkage maps and locate new genes.
Agron., Pl. Genet. 1309

Mo. Improvement of Soft Red Winter Wheat in Missouri.--a. Breeding and Evaluating New Strains of Soft Wheat with Resistance to Leaf Rust, Loose Smut, and Hessian Fly. To breed an improved strain of soft wheat for Missouri, combining leaf rust, loose smut and Hessian fly resistance in a high yielding strain with good quality, using extensively N fertilizers and working for an early, short, stiff-strawed variety; and comparing any new strains originating from this project with standard varieties to find relative merits, and quality of grain by tests to learn its commercial use.
Field Crops 202 Coop. ARS

Mo. The Cytogenetics of Wheat. To (1) get additional information on fundamental genetics of wheat, (2) locate genes on the chromosomes of wheat, & (3) transfer desirable genes to wheat from other genera.
Field Crops 261 Coop. ARS

Nebr. Wheat Evaluation Studies. To (1) determine comparative merits of commercial & experimental varieties of winter & spring wheat for culture in Nebraska; (2) evaluate in appropriate uniform tests varieties developed in neighboring states as to performance & possible use in Nebraska; (3) evaluate strains for market acceptability; & (4) make limited quantities of foundation seed available for further increase from time to time.
Agron. 213 Coop. ARS

Nebr. Breeding Hard Red Winter Wheats for Nebraska. (1) Develop superior strains & make available limited quantities of seed for quality evaluation & testing under Project No. 213. (2) Investigate & learn basic principles relative to genetics & physiology of wheat plant.
Agron., Pl. Path. 509 Coop. ARS

Nebr. Cytogenetic Studies of Economic Characters, Such as Stature and Resistance to Bunt and Rust, in Nebraska Winter Wheats by Means of Aneuploids and Irrigation. (1) Substitute individual chromosomes from Nebraska winter wheat varieties, with immediate emphasis on Cheyenne, into a uniform genetic background, as Chinese Spring, to learn effect of specific winter wheat chromosomes. (2) Develop a set of aneuploid stocks in Cheyenne for use in chromosomal substitutions from other varieties, species, or genera. (3) Locate specific chromosomes of genes for characters as stem rust resistance in Cheyenne & stature in various Nebraska selections. (4) Transfer desirable characters from other varieties, species, or genera to Cheyenne by aneuploids & irradiation-induced translocations.
Agron. 536 Coop. ARS

N. C.

The Development of Soft Red Wheat Varieties with High Yields of Good Quality Grain and with Resistance to Diseases, to Winter Injury and to Lodging.--Breeding--To develop thru breeding varieties or strains of wheat combining as many of these characteristics as possible: 1. resistance to leaf rust, powdery mildew & loose smut, with selection to be made when possible for resistance to other diseases such as scab, glume blotch, & mosaic; 2. high yields of grain of good baking quality & attractive appearance; & 3. stiff straw to stand until ready for combining & sufficient winterhardiness to be grown throughout the state, with special varieties needed for high mountain areas. Testing--To evaluate for characteristics above, promising new strains. Germ Plasm Survey--To make survey of wheat germ plasm to find types which may be used as parents in above breeding program. Genetics--To determine mode of inheritance of powdery mildew resistance in wheat.

Agron., Pl. Path. 56 Coop. ARS

N. Dak.

Hard Red Spring Wheat Improvement. To (1) search foreign wheat collections of USDA for wheat varieties & relatives carrying desirable characters lacking in presently grown commercial hard spring wheat varieties; (2) combine desirable characters by crossing with best commercial varieties & new hybrid selections of hard red spring wheat; (3) make extensive plans & head selection from crosses in segregating generations & test progenies in nursery experiments to establish superiority & adaptability to spring wheat region; (4) establish milling & baking quality characteristics of prospective new wheats; & (5) increase superior wheats for release to growers.

Agron., Cereal Technol. Coop. ARS

N. Dak.

Genetics and Associations of Inherited Characters in Wheat. To (1) establish basic information on inheritance of characters, qualitative & quantitative, in wheat; (2) establish genetic linkage relations for characters whose inheritance is known; & (3) elucidate associations between characters, particularly those economically important, or significant to the wheat improvement program.

Agron. 6-11 Coop. ARS

N. Dak.

Durum Improvement. (1) to find new sources of disease resistance for durum wheat. (2) To evaluate extensive hybrid material for disease resistance including resistance to specific races of stem rust, desirable agronomic types, yield, & semolina quality.

Agron. 6-14 Coop. ARS

Okla.

Breeding of Disease-Resistant Wheats Adapted to Oklahoma. To breed for (1) higher yield through more & larger seeds; (2) grain with higher test weight per bushel & with satisfactory kernel appearance; (3) disease resistance; (4) cold & drought resistance; (5) stiffer straw, non-shattering, & early maturity; & (6) varieties with suitable milling & baking characteristics.

Bot., Chem., Agron. 518 Coop. ARS

S. Dak.

Breeding and Testing Wheat. (1) Stabilize State wheat production by developing adaptable varieties of winter wheat, hard spring wheat, & durum wheat. (2) Test & evaluate available varieties & promising strains of same. (3) Study fundamentals related to wheat breeding, testing, management, & use as well as plant breeding in general. (4) Cooperate in North American cooperative wheat improvement program. (5) Publish results of work at proper intervals.

Agron. 181

Tenn.

Breeding for Improvement in Wheat Varieties to Include Resistance to Disease, Hessian Fly, and Changes in Morphological Characters. To (1) use present Tennessee lines to add softness & other desirable milling qualities--earliness of maturity, short & stiff straw, smooth or awnless heads; resistance to black chaff, scab, & take-all; (2) incorporate resistance to Hessian fly; (3) select for feed & pasture types in crosses; & (4) test soft wheats for disease resistance in addition to those now available.

Pl. Path. 136 Coop. ARS

Tex.

Wheat Improvement. (1) Develop new varieties of wheat superior to present varieties & adapted to production of grain and/or forage, in state or introduce variety. (2) Study development of varieties resistant to diseases prevalent in each area as leaf & stem rust, smuts, mildew, septoria, & root rots. Breeding & control studies of rusts will be coordinated with Project 983 & will include wheat grown for forage & grain. (3) Learn quality characteristics of new varieties & strains. (4) Study forage characteristics of varieties & strains. (5) Learn cold resistance of strains for release. (6) Search for resistant germ plasm to greenbug attacks.

Agron., Pl. Physiol., Path. 1033 Coop. ARS

Utah

Improvement of Fall-Sown Wheat Through Breeding. Combine high yield, good quality, bunt resistance, & other desirable agronomic characteristics in winter wheat varieties adapted to the wheat growing areas of Utah & the Intermountain region.

Agron. 328 Coop. ARS

Wash. The Transfer of Economic Characters from Related Genera and Species to Common Wheats. To transfer immune or high type of resistance to available races of leaf & stem rust, bunt, mildew, & other agronomic characters, such as solid stems, & shorter, stiffer straw from available *Triticum* & *Agropyron* species to stable hexaploid wheat derivatives of value as parents in future wheat varieties.
Agron. 966 Coop. ARS

Wash. The Development of New Wheat Varieties for the Big Bend Dry Land Area of Washington. To develop high-yielding wheat varieties with desirable quality & varietal characteristics facilitating combine harvesting in this general area.
Agron. 993 Coop. ARS

Wash. Breeding and Improvement of Spring Wheat Varieties for Washington. To develop spring wheat varieties with these characteristics: 1. as wide or wider ranges in baking characters as Idaed or Baart; 2. winter-spring seeding habit better than Orfed or Marfed; 3. high type resistance to diseases such as bunt, leaf & stem rust, & mildew; 4. greater lodging resistance than Baart for dry land conditions; 5. wider range of adaptability than Idaed or Marfed; 6. shorter straw for high rainfall areas & conditions than found in present varieties.
Agron. 994 Coop. ARS

Wash. Breeding Wheats Resistant to Stem Rust (Including Race 15B) and Leaf Rust for Washington. To incorporate and test resistance to stem rust, (including race 15B) and leaf rust in new selections for wheat for Washington.
Agron. 1081 Coop. ARS

Wyo. Breeding and Selection Studies with Wheat. To (1) develop improved varieties of wheat, outstanding for yield, desirable agronomic characters, & disease & insect resistance; (2) determine & recommend outstanding varieties for production in Wyoming; & (3) be responsible for source of genetically pure breeders seed of recommended, named, released varieties thru the Experiment Station & Wyoming Crop Improvement Assn., to the pullic of Wyoming
Agron., Agr. Econ. 489

Wyo. Drought Resistance Studies with Winter Wheat Seedlings. Obtain selections of winter wheat exhibiting drought resistance in seedling stage. Learn heritability percentage of same, & potential of selected strains as possible new varieties or improved selections of the variety Cheyenne.
Agron., Pl. Physiol. 603

B. Culture and Physiology

Kans. The Influence of Temperature Extremes and Accompanying Water Relations on the Physiology of the Wheat Plant, its Organs, and Tissues. To investigate specific influence of low & high temperatures & accompanying water relations on basic physiological activities of winter wheat plant, its organs, & tissues, with the ultimate goal to determine specific changes which occur at these various levels of organization as result of temperature extremes.
Bot., Pl. Path. 250 Coop. ARS

Ohio Winter Injury to Crop Plants from the Indirect Effects of Low Temperature. (1) Learn more specifically the mechanics of the phenomenon of heaving, & the environmental conditions leading to its occurrence. (2) Study anatomical, morphological & physiological characteristics of species, & particularly of varieties, bearing a relation to their ability to survive conditions normally producing heaving.
Agron. 174 (NC-42) (Also see Part 18.)

Okla. The Relationships of Soil and Fertilizer Treatments to Wheat Production. To learn (1) effect of plowpan disruption, (2) effects of 2 methods of residue management, (3) if response of wheat to fertilizer varies with residue management & pan disruption, (4) N & P needs of wheat on soil continuously cropped to wheat.
Agron. 1002 Coop. ARS

Wyo. A Study of Methods of Summer Fallowing Winter Wheat Land. Learn (1) effect of mechanical & chemical fallow systems & their combinations on soil fertility, crop yield, & weed control; (2) influence of mechanical & chemical fallow systems & their combinations on water intake rates. (3) Compare costs of various summer fallow operations.
Agron. 582 (W-32) Coop. ARS (Also see Part 3, Section a.)

C. Harvest, Storage and Processing

Colo. Maintaining Marketability of Wheat in Farm Storage and Country Elevators Through the Control of Insects. To (1) obtain technical data on distribution, infestation, reservoirs, & conditions favoring high population densities of principal species of insects affecting marketability of wheat on farm & in country elevators; (2) determine value of various commercial protectants & fumigants to improve marketability of grain under farm storage; (3) study role of lesser grain borer as a factor in lowering quality & marketability of wheat; & (4) determine effect of insect damage in terms of economic loss to farmers & estimate increased returns from use of protective treatments.
Ent. 217 (WM-16) (Also see Part 7, Section c.)

Kans. The Influence of Environment on the Varietal Quality of Hard Red Winter Wheat. To determine the influence of environment, including meteorological and agronomic variables on the quality characteristics of a number of varieties of hard red winter wheat.
Agron., Milling Indus. 60

Kans. Factors which Influence the Colloidal Properties of Dough. To clarify the colloidal behavior of wheat flour doughs & to determine the influence of (1) the constitution of the gluten protein, & (2) the factors in the gluten environment which modify its properties.
Milling Indus. 200 Coop. ARS

Kans. Micromeasurements of Physical Grain Properties. (1) Develop & modify micro-radio-graphic technics & metallurgical hardness testing methods to permit rapid microdetermination of hardness & density of wheat kernels. (2) Correlate these measurements with those technological properties of wheat & wheat products of concern to agriculture & the flour milling industry.
Physiol., Flour & Feed Milling Indus. 478

Kans. Wheat Conditioning. (1) To investigate interactions of wheat type, time, temperature, pressures, & moisture content on flour yield & flour properties. (2) Determine the physical & chemical changes in wheat when subjected to the various conditions developed during conditioning.
Flour & Feed Milling Indus. 505

Kans. Biochemical and Physiological Factors which Influence Wheat Quality. (1) To learn the biochemical & physiological factors in wheat which affect its quality for utilization. Such factors include pre-harvest & post-harvest conditions, & treatments which influence biochemical quality, viability, & physical properties of grain.
Flour & Feed Milling Indus. 506

Kans. Development and Testing of Rapid Inspection Methods for Insect and Rodent Contamination in Wheat and Wheat Products Suitable for Market Grading. Originate, develop, & test technics to learn presence of internal insect infestation & contamination due to rodents in grains suitable for use under United States Grain Standards.
Flour & Feed Milling Indus. ES 459 Coop. HEW-FDA, AMS

Minn. The Biochemistry of Milling, Baking, and Macaroni Manufacture.--I, Milling.--II, Baking and Macaroni Manuracture. III, Wheat and Flour Constituents in Relation to Biochemical Properties of Cereal Foods.--IV, Dough Ingredients Other Than Wheat Products. To determine (1) fundamental principles involved in the conversion of wheat & typical wheat products into "bread stuffs," (2) quantity & nature of various wheat & flour constituents & their effect upon processing requirements; (3) function of typical ingredients of the formulas followed in manufacturing such foods.
Biochem. 1503

Minn. Effect of the Association of Molds and Insects on the Keeping Quality of Stored Grain. To learn if the development of insects within stored grain bulks is associated with, or contributes to, growth of storage molds that are known to lead to heating & other spoilage of stored grains.
Ent. 1730

Mo. Improvement of Soft Red Winter Wheat in Missouri.--a. Testing the Flours from Regular Varieties and from Experimental Strains of Wheat for their Adaptiveness to Different Culinary Purposes. To evaluate and compare baking qualities of flours milled from new varieties and experimental selections of wheat with known varieties, testing 18-20 flour samples.
Home Econ. 205

Nebr. Studies of Flour and Baking Quality Factors by Methods Involving Fractionations and Recombinations of Protein, Starch, and Other Flour Components. To determine the extent to which various individual fractions of flour, starch, protein, & other components, respectively, influence flour baking behavior & hence the industrial utility of wheat.

Chem. 129

Nebr. Enzymes of Wheat and Flour and Their Relation to Baking Characteristics. To study (1) methods for identification & estimation of flour enzymes; & (2) their relation to flour properties.

Chem., Nutr. 184

N. Dak. Wheat Protein Fractions and Baking Quality. To determine cause of differences in baking quality between protein fractions from different hard red spring & durum wheats & to ascertain effect of proteolytic enzymes upon properties & relative distribution of these protein fractions.

Cereal Technol. 10-1

N. Dak. Quality Investigations of Hard Red Spring Wheat Varieties. To insure development & release of new hard red spring wheat varieties of excellent quality in N. Dak., by determining milling & baking qualities & associated attributes of quality of varieties & hybrids from experimental plots at Fargo & branch stations.

Agron., Cereal Technol. 10-2

N. Dak. Durum Wheat Quality Evaluation for Consumer Acceptance. To insure that new wheat varieties developed for resistance to current plant diseases, particularly the 15B rust complex, will be readily accepted by the consumers, & to develop new criteria of durum quality.

Cereal Technol. 10-4

Ohio Quality Evaluation of Soft Winter Wheats. Learn factors responsible for differences in quality among soft wheat strains & varieties; & improve & develop standards for evaluating quality of soft wheats; evaluate quality characteristics of new strains from soft wheat breeding programs of station in region.

Field Crops 133 (NC-30) Coop. ARS

Okla. Methods for Quality Evaluation of Small Wheat Samples. To (1) establish a satisfactory method for production of flour from small samples of wheat; (2) establish methods suitable for baking quality evaluation of flours from small samples; & (3) investigate relationships between milling & baking quality & chemical & physical properties of wheat.
Agr. Chem., Agron. 875

Wash. Lysine Content of Wheat Varieties, Species and Related Genera. (1) Verify lysine nature of proteins of certain wheat varieties, species, & related genera, as shown by preliminary studies. (2) Establish relation of lysine content of wheat protein to the location where plant is grown.
Agr. Chem., Agron. 1376 Coop. USDA

D. Diseases and Insects

Kans. Hessian Fly and Other Insects Attacking the Growing Wheat Plant Above Ground. To (1) study insect infestation & abundance of wheat fields in relation to climatic conditions & farm practices. (2) Collect & identify the insects, & study life histories of insects, affecting the living wheat plant above ground. (3) Measure injury done & where necessary work out control measures for each species. As opportunities are available, this will include the testing of new insecticides.
Ent. 283 Coop. ARS

Kans. Investigations of Mosaic and Other Virus Diseases of Hard Red Winter Wheat. To (1) discover additional means of virus transmission and spread; (2) find additional sources or reservoirs which harbor the virus; (3) discover more cultural practices which will aid in control; (4) find resistant parental stock for breeding; (5) obtain varieties of hard red winter wheat more resistant than those now grown; and (6) conduct basic research on the virus.
Bot., Pl. Path. 334 Coop. ARS

N. Dak. Wheat Plant Structures in Relation to Wheat Stem Sawfly Resistance. Study histological structure of wheat plants as it may relate to sawfly resistance.
Ent. 5-5 Coop. ARS

Okla. Diseases of Wheat and Their Control. To (1) continue leaf-rust study to determine prevalent races & shifts in race populations, & watch for new races or build-up of what are now minor races; (2) thoroughly study race separation & identification, including races 21, 54, 105, & 126, (3) devise a method of collecting & storing rust samples which will maintain the viability of rust spores, (4) study climatology in relation to winter survival & spring build-up of leaf-rust, (5) observe varieties & selections in various nurseries to determine their reaction to Septoria leaf blotch, to search for varieties or selections resistant to Septoria, & if possible, to determine how resistance is inherited; & (6) correlate weather records with intensity of Septoria infection to learn what factors control epidemics of the disease.
Agron., Bot., Pl. Path. 772 Coop. ARS

E. Economics and Marketing

Idaho The Economic Effects of Soil Conservation Practices on Yields, Costs, Returns and Farm Income in the Palouse Wheat-Pea Area. To (1) measure economic effects of specific conservation practices, including a. legume, grass, and grass-legume rotations, b. fertilizer use, c. drainage of bottom lands, d. strip cropping, and e. subsoil cultivation; (2) measure effect of above practices on weed control costs and on weed populations as is considered feasible and practical; (3) add other conservation practices when they are used by farmers in the area; (4) obtain information on the physical inputs and outputs associated with these practices; (5) measure changes in farm income resulting from such practices or combinations thereof; and (6) continue some of the objectives of present Purnell project 149, such as a. study methods of using a simple system of records to increase farm earnings; b. study reasons why farm earnings vary in wheat-pea area; c. discover more important measures of efficiency and organization affecting farm earnings; and d. apply much of the above information with needed variations to other sections of Idaho.
Agr. Econ., Agron. 237 Coop. SCS

Idaho

Adjustment Opportunities for the Snake River Valley Irrigated and the Southeastern Idaho Dry Wheat Producing Areas. (1) Study wheat farms in irrigated & dry-land areas of Idaho to learn place of wheat in entire farm enterprise combination by areas & by types & sizes of farms. (2) Learn costs & returns from alternative possible enterprise combinations with & without wheat. (3) Ascertain at what relative prices wheat would be profitable to produce & learn number of acres which it would be economical to shift out of wheat at various price levels. Learn what crops & in what quantities land shifted from wheat would be expected to produce. Measure extent to which anticipated shifts on basis of economic advantages occur. Learn factors that retard or prevent shifts from occurring which would be economically desirable. (4) Assist other areas in analyzing impact effect of shifts in Idaho on other crops & on other agricultural regions & areas of the country.

Agr. Econ. 335 (W-54) Coop. ARS (**Also see Part 2, Section b.**)

Kans.

Organization of the Market for Wheat. To analyze (1) structure of wheat marketing systems to establish criteria to assist in marketing of wheat as required by changing techniques of production and consumer demand; and (2) impact of recent advances and developments of technology of wheat production to determine related adjustments needed in marketing system to provide efficient movement of wheat from producers to consumers.

Agr. Econ., Milling Indus. 703, ES 270

Mont.

Preliminary Investigation of the Market Structure Prices, and Price Policies for Wheat with Particular Reference to Montana Wheats. To (1) describe market mechanisms for wheat & their price making roles: find sources of information & appropriate research techniques for use in a subsequent project, the objectives of which will be: a. to analyze current & past domestic & foreign demand for wheat, especially classes & qualities of wheat produced in Western Region; b. to analyze current & past domestic & foreign supply conditions for wheat, especially that produced in Western Region; & c. determine differences in price for & quantity of principal kinds of western wheats that may result from various national wheat price & production policies.

Agr. Econ. 911 (WM-13) Coop. USDA (**Also see Part 2, Section a.**)

Mont. Supply Response of Wheat on Dryland Crop Farms in Montana. (1) Establish a classification of farms according to similarities in adjustment problems & opportunities thru the wheat growing regions. (2) Estimate individual farm production response to change in price of wheat, given prices of products from enterprises which comprise alternatives to wheat on dryland crop farms. (3) Estimate individual farm production response to change in price of wheat, given organization of resources & practices within enterprises on dryland crop farms. (4) Estimate aggregate production response in areas selected on basis of similarity between farms in organizational alternatives.

Agr. Econ. & Rur. Sociol. 1076 (W-54) Coop. ARS (Also see Part 2, Section b.)

N. Dak. Impact of Wheat Price Support Programs on Wheat Production, Marketing and Farm Income in North Dakota. To measure & appraise impact of wheat price support programs on 1. acreage, yield & production of wheat; 2. acreage & production of competing crops; 3. prices received by farmers; 4. farm income; 5. marketing practices, storage & seasonality of sales; & 6. protein & durum premiums & price differentials between goods.

Agr. Econ. 3-6 (NCM-11) (Also see Part 2, Section a.)

Ohio Wheat Price and Income Policy. (1) analyze methods used & costs of wheat price & income support programs in Ohio; (2) estimate effects of past wheat programs on farm income, wheat & other farm prices, wheat production, farm organization, marketing organization, costs & practices, & storage operations; & (3) apply above information so as to predict nature of changes to be expected from alternative policy programs which may be considered in the future.

Agr. Econ., Rur. Sociol. 125 (NCM-11) (Also see Part 2, Section a.)

Oreg. Production and Marketing of Pacific Northwest Wheat Under Selected Programs. To appraise plans or programs for wheat to determine the probable effects of each of several plans on the production & marketing of wheat in the Pacific Northwest over a ten-year period.

Agr. Econ. 164

Oreg. Economic Analysis of Fertilizer Use on Wheat in the Columbia Basin. Investigate most profitable levels of fertilizer application & costs & returns associated with the practice.

Agr. Econ. 303-3 Coop. ARS

S. Dak. Wheat Price and Income Policy. To ascertain social & economic effects of government program from these points of view: 1. volume & location of wheat production; 2. use of agricultural resources, land, labor, equipment, fertilizer, & other supplies; 3. production of other agricultural products; 4. wheat prices, size of farms, distribution & size of farm income; 5. size & mobility of farm population; 6. size & stability of real & money national income; & 7. milling quality & supplies of desired milling varieties of wheat.
Agr. Econ. 263 (NCM-11) **(Also see Part 2, Section a.)**

Wash. Wheat Prices and Price Policies in the Pacific Northwest. To analyze (1) price structure for wheat with reference to relation of prices of soft & hard Pacific Northwest wheats to prices of other wheats in both U. S. & world markets; (2) short-run & long-run effects of different levels of wheat prices on production of & income from wheat in Washington under conditions of no production controls; & (3) effect of various alternative price & production controls for wheat on structure of wheat prices, on structure of agricultural production, & on income from agriculture in Washington.
Agr. Econ. 1223 (WM-13) Coop. AMS **(Also see Part 2, Section a.)**

Wash. Appraisal of Adjustment Opportunities for the Major Wheat Producing Areas of Washington. (1) Appraise production adjustment opportunities on individual farms, the problems involved in making these adjustments & ways by which desirable adjustments can be facilitated. (2) Learn aggregative effects of adjustments of production adjustments that would be profitable on individual farms in the major wheat-producing areas of state.
Agr. Econ. 1386 (W-54) Coop. ARS **(Also see Part 2, Section b.)**

Wash. The Role of Hedging in Marketing Washington Wheat. (1) Explain why hedging does not play an important role in Pacific Northwest grain market. (2) Assess need & possible disadvantages of hedging in each segment of Pacific Northwest grain trade. (3) Learn what marketing & institutional changes would make hedging more feasible in marketing Washington wheat.
Agr. Econ., Agr. Ext. 1387

Wyo. Production Adjustment Opportunities for Wheat on Wyoming Dryland Farms. (1) Classify dryland wheat farms in eastern tier of counties, according to similarities in opportunities for production adjustment thru changes in farm organization. (2) Estimate change in wheat production on individual representative farms that might occur in response to postulated changes in wheat price. (3) Estimate increased production of alternative farm products which might result from a reallocation of resources between enterprises as a result of changes in wheat price. (4) Aggregate probable change in production for wheat & alternative farm products which might result from assumed change in wheat prices.

Agr. Econ. 694 (W-54) Coop. ARS **(Also see Part 2, Section b.)**

Regional Research, Including States with Contributing Projects

NC-30 Quality Evaluation of Soft Winter Wheats. To (1) determine the factors responsible for differences in quality among soft wheat strains and varieties, (2) develop new procedures and improve standard procedures for evaluating the quality of soft wheats, (3) evaluate the quality characteristics of new strains from the soft wheat breeding programs of stations in the region.

Cooperating stations and agencies: Federal-grant project - Ohio VII-C; ARS

NCM-23 Factors Influencing Market Quality of Seeds. To (1) improve and standardize testing methods through investigation of (a) laboratory methods of seed germination and (b) factors affecting germination and dormancy; (2) improve market quality of seed through investigations of seed quality as influenced by harvesting, processing and storage methods.

Cooperating stations: Federal-grant projects - Ill. I-F, Ind. I-F, Iowa I-F, Nebr. I-F.

NE-23 Breeding of Small Grains for Resistance to the Hazards of Production in the Northeastern States. To (1) develop high-yielding stiff-strawed varieties of small grains, resistant to major diseases and insect pests, which possess desirable agronomic and quality characteristics suitable for the region; (2) obtain fundamental knowledge of diseases and their causal agents; of insects; of the factors that influence winter hardiness, resistance to lodging, and other agronomic characters of importance in grain production; in order to develop efficient breeding programs and control methods to reduce crop losses.

Cooperating stations and agencies: Federal-grant projects - Maine IV, Md. I-A, N. J. II, N. Y. (Cornell) I-A, Pa. I-D, W. Va. II; ARS

NEM-22 *Facilitating the Marketing of Seeds Through Improved Procedures for Testing the Varietal Purity and Identity of Seeds of Varieties of Perennial Forage Crops Recommended and/or Developed for the Northeast*. To develop and test the validity of techniques for use in ascertaining varietal purity and identity of forage crop seeds by means of seed, seedling, or plant characteristics as follows: Investigate (a) the possibilities of identifying varieties by means of chemical, physiological, morphological, pathological, and other tests which could be conducted in the laboratory, greenhouse, or climate chamber, (b) methods of improving trial plat techniques for measuring varietal purity and identity.

Cooperating stations: Federal-grant projects -
N. Y. (State) I-F, Pa. I-F, R. I. I-F.

SM-21 *Factors Influencing Market Quality of Seed*. To (1) improve and standardize tests for seed germination and mechanical purity; (2) develop laboratory tests for seedling vigor and trueness to variety or type; (3) investigate the physiology of seeds during curing, storage, and germination.

Cooperating station: Federal-grant project - Miss. I-F.

WM-35 *Facilitating the Marketing of Seed Through Improved Testing Procedures*. To (1) develop, improve and standardize laboratory methods for sampling and determining germination, mechanical purity, seedling vigor and seed identity; (2) develop methods of evaluating mechanically and otherwise damaged seeds; (3) obtain information on the physiology and biochemistry of seed so as to relate these factors to seed testing procedures; (4) develop improved methods of identification of seed pathogens applicable to improved seed testing procedures.

Cooperating stations: Federal-grant projects -
Calif. I-F, Colo. I-F, Oreg. I-F

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	a. Prices, Incomes, & General Studies of Commodities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation
3	Agricultural Engineering	a. Land & Water Use & Development b. Power Machinery & Equipment c. Farm Structures & Materials
4	Animal Husbandry	a. Beef Cattle b. Sheep & Goats c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides
8	Field Crops	a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	a. Food Chemistry, Microbiology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	a. Human Nutrition b. Housing c. Clothing & Textiles d. Foods-Consumer Quality & Utilization e. Household Economics & Management
14	Economics of Marketing	a. Field Crops b. Fruits & Vegetables c. Livestock, Meats & Wool d. Dairy Products e. Poultry & Poultry Products f. Forest Products & Ornamental & Drug Plants g. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops b. Diseases of Field Crops c. Diseases of Fruit Crops d. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	a. Soil Chemistry & Microbiology b. Soil Fertility, Management & Soil-Plant Relationships c. Soil Physical Properties, Conservation & Classification
22	Vegetables	a. Vegetable Crops b. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control